

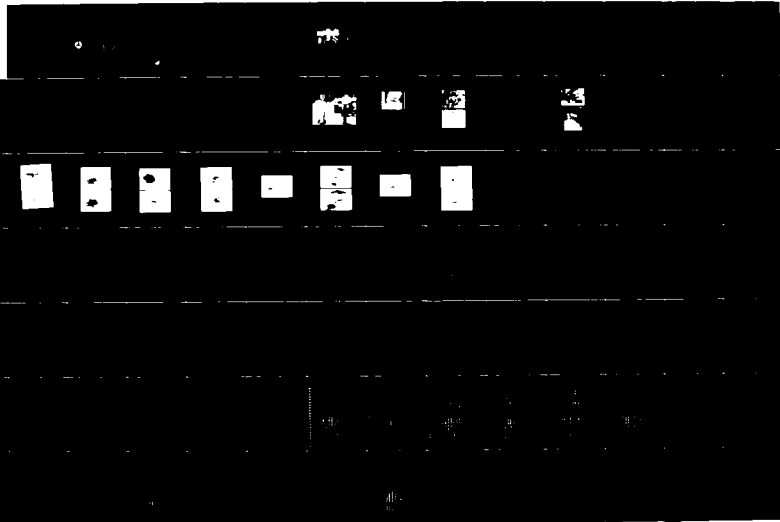
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FY87 EVALUATION OF SHIPBOARD ELECTRO-OPTICAL APPARATUS  
FOR USE IN LAW ENF. (U) COAST GUARD RESEARCH AND  
DEVELOPMENT CENTER GROTON CT F REPLOGLE DEC 87  
CGR/DC-18/87 USCG-D-87-88

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Report No. CG-D-07-88

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**FY87 EVALUATION  
OF  
SHIPBOARD ELECTRO-OPTICAL APPARATUS  
FOR USE IN LAW ENFORCEMENT AND SEARCH**

F. REPLOGLE, JR.

U.S. COAST GUARD RESEARCH AND DEVELOPMENT CENTER  
AVERY POINT, GROTON, CONNECTICUT 06340-6096

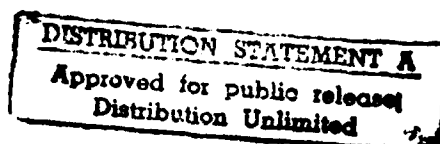
FINAL REPORT  
DECEMBER 1987



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Prepared for:



U.S. Department Of Transportation  
United States Coast Guard  
Office of Engineering and Development  
Washington, DC 20593

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Technical Report Documentation Page

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16. Abstract  Three 120 line common-module FLIR (Forward Looking Infra-Red Imaging) units were tested on medium endurance cutters to ascertain how well they support Coast Guard law enforcement and search requirements. Large ship classification ranges varied from 3 to 13 nmi, depending upon the absolute humidity of the air path. Ranges for identifying the class of boats as fishing vessels were from 2 to 13 nmi, and the range for observing men on deck was 1 nmi. Identification and classification ranges were typically less than the desired 10 nmi and 5 nmi, respectively.  A study of the utility of the NVS-500 night scope showed that its utility is limited to viewing objects having no visible lights.  A further study directed toward alleviating the limitations of these instruments is recommended.					
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# METRIC CONVERSION FACTORS

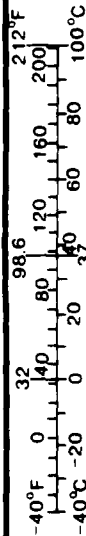
## Approximate Conversions to Metric Measures

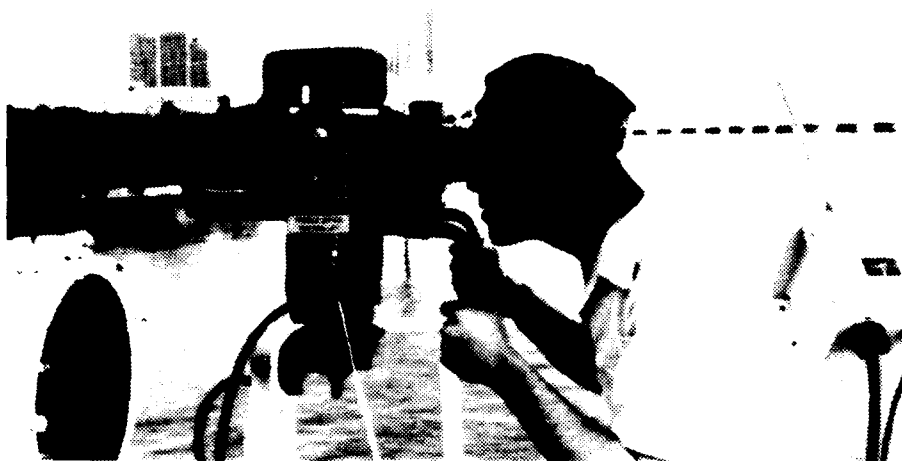
Symbol	When You Know	Multiply By	To Find	Symbol
<b>LENGTH</b>				
in	inches	* 2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
<b>AREA</b>				
in <sup>2</sup>	square inches	6.5	square centimeters	cm <sup>2</sup>
ft <sup>2</sup>	square feet	0.09	square meters	m <sup>2</sup>
yd <sup>2</sup>	square yards	0.8	square meters	m <sup>2</sup>
mi <sup>2</sup>	square miles	2.6	square kilometers	km <sup>2</sup>
acres	acres	0.4	hectares	ha
<b>MASS (WEIGHT)</b>				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
<b>VOLUME</b>				
tsp	teaspoons	5	milliliters	ml
tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft <sup>3</sup>	cubic feet	0.03	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.76	cubic meters	m <sup>3</sup>
<b>TEMPERATURE (EXACT)</b>				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

\* 1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures. Price \$2.25. SD Catalog No. C13.10.286.

## Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply By	To Find	Symbol
<b>LENGTH</b>				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
<b>AREA</b>				
cm <sup>2</sup>	square centimeters	0.16	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	1.2	square yards	yd <sup>2</sup>
km <sup>2</sup>	square kilometers	0.4	square miles	mi <sup>2</sup>
ha	hectares (10,000 m <sup>2</sup> )	2.5	acres	
<b>MASS (WEIGHT)</b>				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
<b>VOLUME</b>				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	0.125	cups	c
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m <sup>3</sup>	cubic meters	35	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.3	cubic yards	yd <sup>3</sup>
<b>TEMPERATURE (EXACT)</b>				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F





— Frontispiece —

AN / KAS-1 FLIR on CGC *Vigorous* Operated by Seaman

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

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#### ACKNOWLEDGMENT

The author wishes to thank Technicians Robert Stachon of the R&DC and Robert Barry of ORI, Inc. for the skilled work they performed in assembling, installing and operating the equipment. This made possible the three test series to be described. Thanks should also be extended to CDR Edwards, LCDR Palmer, ENS Dietrick, and crew members of the CGC VIGOROUS for the extra hours spent in careful testing of the FLIR unit and careful maintenance of the FLIR log--used for drawing conclusions about the instrument's utility. Likewise thanks should be extended to CDR Parkin, LT McKenzie, QMC Bears and crew members of the CGC DECISIVE for the thoughtful effort given to operating and evaluating the FLIR unit. Data obtained from the video recordings will be useful in predicting the utility of the instrument and in deriving stability and automatic search requirements for future FLIR units.

Thanks should also be given to the Naval Sea Systems Command (W. Noyes) and to the Naval Weapons Supply Center (L. Boyd) for lending the Coast Guard a Model KAS-1 FLIR and for personal instructions by L. Boyd on its use. This unit was installed and operated successfully aboard the CGC VIGOROUS. Appreciation is likewise given for the effort of the Naval Surface Weapons Center (S. Herndon) for modifying the contract with Texas Instruments to permit the R&DC to rent the instrument installed on the CGC DECISIVE.

## 1.0 EXECUTIVE SUMMARY

Coast Guard operational requirements for electro-optic sensors for medium and high endurance cutters call for night classification of vessels at 20,000 yards and observation of deck details at 10,000 yards. As an "interim solution" for meeting the requirements, a set of "low cost" unstabilized FLIR units was tested. Three unstabilized Texas Instruments units which were variations of the Navy AN/KAS-1 Chemical Warfare Detector were tested--one from shore, one on the CGC VIGOROUS, and one on the CGC DECISIVE. The unit tested on the DECISIVE was fitted with a video pickoff, display, and tape recorder. For the other units individuals recorded details seen, ranges, and ambient conditions in logs. Magnifications available on the sensors were 3X and 9X. The narrower field of view (9X) was  $1.1^{\circ}$  vertical X  $2.2^{\circ}$  horizontal. The stated resolution was 0.13 mrad.

The tests on the VIGOROUS were performed from March 6 to April 17, 1987 off the east coast of North America at latitudes from  $42^{\circ} 30'$  to  $18^{\circ} 40'$ . The tests on the DECISIVE were performed from May 19 to June 17, 1987 in the Gulf of Mexico and the Caribbean Sea at latitudes from  $26^{\circ}$  to  $18^{\circ}$ .

The tests included detection and classification of ships and observations of activities on deck at various ranges with the FLIR sensors. Because of operator difficulties with an unstabilized sensor, search was performed efficiently only in brief tests with the unit placed on the shore of Long Island Sound. In all cases logged, initial detection was obtained by the ship's radar or binoculars (Big Eyes).

Maximum classification ranges for large vessels were from 27,000 yd in northern latitudes to 6,000 yd in southern latitudes. The ranges for classifying fishing vessels was from 26,000 to 4,000 yd. The classification and deck detail observation ranges demonstrated in tropical waters thus

fell significantly below the stated 20,000 and 10,000 yard requirements. Large vessel maximum ranges were correlated with the absolute humidity content of the atmosphere. This is a primary cause of loss of image contrast at these (8 to 12 microm) wavelengths. From the maximum range vs absolute humidity observations and weather data on mean temperatures at various locations around the CONUS, it was concluded that this type of FLIR could meet a 20,000 yard classification requirement only in the winter half of the year at latitudes north of the 40'th parallel in the Atlantic and north of the 30'th parallel in the Pacific.

Details as small as a man on deck were seen reliably with ranges of 2,000 yards or less. Increasing the range at which small deck details can be observed would require both less signal attenuation by the atmosphere and higher resolution in the sensor.

The tests gave qualitative confirmation of the improvement in imaging through thin nascent (small particle) fog and haze over imaging with visible light.

Tests of the NVS-500 night sight and previous experiences of the ships' personnel showed that this instrument was useful only for locating glows from ships over the horizon and for examining unlighted ships. The presence of any deck or running light tended to blank other features on the ships.

From the image motion remaining after manual stabilization, as observed in the video recordings, it is concluded that automatic stabilization is mandatory when the ship roll and pitch are over five degrees.



Since classification ranges in tropical waters were found to be far less than the stated requirements, the R&D Center recommends that a study be performed to ascertain if the response of the instruments can be increased by optical filtering or by selecting a new wavelength band. Also the study should include consideration of how the resolution of the instrument can be improved by a factor of two or greater.

## 2.0 ADMINISTRATIVE BACKGROUND

Coast Guard Headquarters' Office of Operations provided operational requirements for shipboard electro-optical sensor systems for Coast Guard Medium and High Endurance Cutters (G-OLE memo 3900 of 9 March 1983). Requirements called for a stabilized electro-optical system with which the operator could:

- a. "Classify radar targets at 10 miles (20,000 yards)".
- b. "Observe ship deck details at 5 miles (10,000 yards)".

Control was to be from within the ship.

As an interim solution to these requirements, G-DST identified several "low cost", "light weight", unstabilized FLIR's (Forward Looking Infra Red viewing apparatus) which could partially meet primary requirements. One of these, an AN/TAS-6 Night Observation Device, was lent to the R&D Center for shore-based performance tests. Equivalent devices hardened for the marine environment were to be obtained, installed and tested similarly. Capabilities of the devices for searching were also to be assessed.

During the performance of the task, the R&DC was also requested to determine the utility of the NVS-500 night viewing apparatus carried on many Coast Guard ships.

### 3.0 OPERATIONAL TESTING

#### 3.1 Operational Requirements

The primary requirements referenced in Section II were interpreted as follows:

- a. classify a large ship as to type (from size and shape details) at a range of 20,000 yd.
- b. classify smaller ships, e.g., fishing vessels, (from observing deck and mast details) at a range of 10,000 yd.
- c. determine ranges at which the NVS-500 could perform the classification tasks above.

In addition to the testing called for by the primary requirements, tests were performed to determine the ranges at which men could be observed on deck and to determine the utility of the IR (Infra Red) apparatus used as a search tool.

#### 3.2 Data Requirements

The primary emphasis for testing FLIR devices is to document the capability of the devices in helping law enforcement personnel perform their missions. Since overall performance is a function of both the Law Enforcement scenario and environmental conditions, it is necessary to document both actions and ranges of targets and ambient weather (including thermal) conditions. In this report observations of target ranges and ambient conditions are correlated where possible and overall results are summarized.

#### 3.3 Imaging Apparatus Tested

Three sets of infrared imaging apparatus manufactured by Texas Instruments were tested. The core element of each was one common module FLIR assembly. The properties of the assembly are given in Table I.

TABLE I  
ELECTRO-OPTICAL CHARACTERISTICS OF COMMON MODULE FLIR

	Wide Field	Narrow Field
Field of View	3.4°(V) X 6.8°(H)	1.1°(V) X 2.2°(H)
Magnification	3X	9X
Resolution	0.4 mrad	0.13 mrad
Display Reticle Scale	4.91 mrad/sm div	1.64 mrad/sm div
Minimum Resolvable Temperature Difference	0.3°C. (catalog); 0.5 to 1.0°C. (operational test)	
Entrance Aperture	105 mm	
Viewing Aperture (Biocular)	76 mm	
Display Color	green	
No. of Detectors	60	
No. of Horizontal Scan Lines	120	
Sensor Weight	24 lb.	

Items comprising the three sets of apparatus were as follows:

1. Shore-based apparatus:

Texas Inst. Model AN/TAS-6 Sight for US Army artillery--  
using pressure bottles for cooling and a battery power pack

Sensor Mounting Tripod

Polaroid Recording Camera

Laser Range Measuring Apparatus

2. Apparatus tested on CGC VIGOROUS:

Texas Inst. Model AN/KAS-1 Navy Sensor for chemical cloud  
detection--using ship's power for cooling and operation--  
used without IR wavelength filters. See Frontispiece.

Pedestal built by R&DC, modified from Navy design to give  
adjustable height (see Figure 1).

Thermal Target for checking apparatus sensitivity (see  
Figure 2).

3. Apparatus tested on CGC DECISIVE:

Texas Inst. Model AN/KAS-1 Navy Sensor, as above, but with  
video pickoff added by T.I.

Thermal Target for checking apparatus sensitivity

Pedestal built by R&DC, improved over unit used on CGC  
Vigorous (see Figure 3).

Infrared Lens Assembly used to double the sensor  
magnification, the "2X Extender"

Sony Model VO-5600 Video Tape Recorder for 3/4 inch tape--  
with remote control box and microphone, plus audio amplifier  
and speaker for playback

Sony nine inch Black and White Monitor --used on the bridge  
to observe the sensor output and tape playback

Time Code Generator for adding time to video recordings

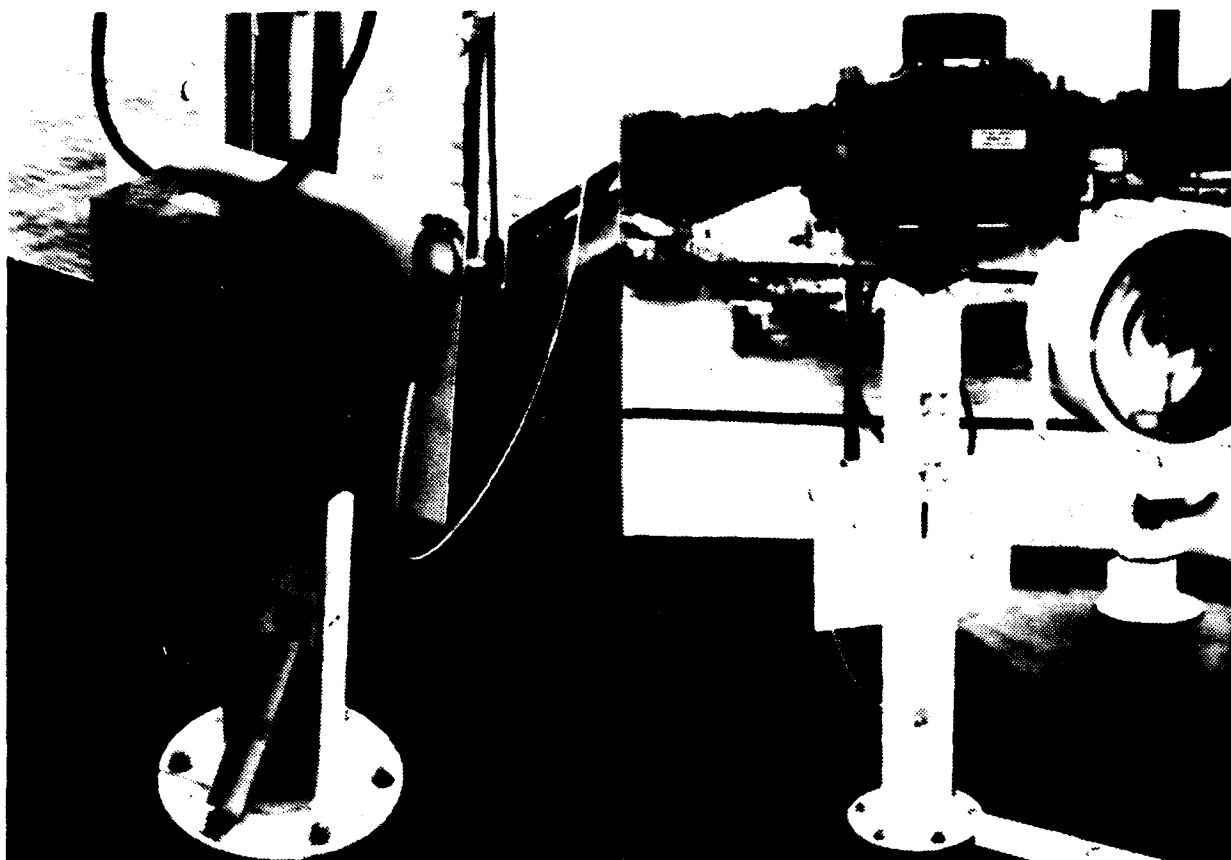


FIGURE 1. Front and Rear Views of Mount for AN / KAS-1 FLIR on CGC *Vigorous*

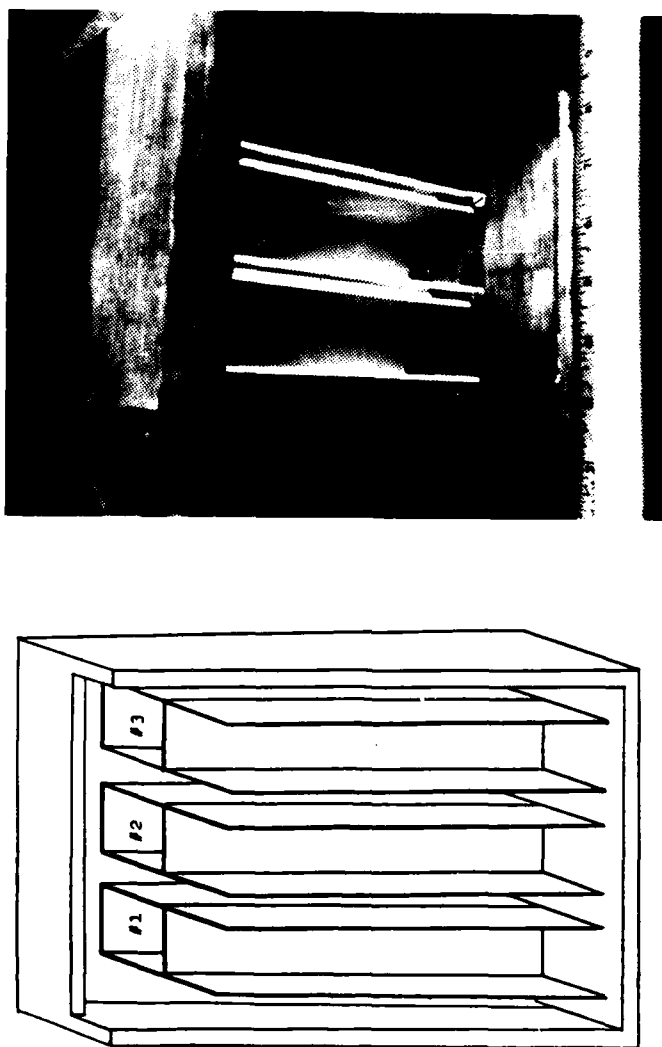


FIGURE 2. Construction of FLIR Sensitivity Tester

Reservoirs 1, 2, 3 are nearly filled with water at three different temperatures. Three aluminum "U" channels are thermally connected to the reservoirs so they perform as IR black bodies of bar shape.

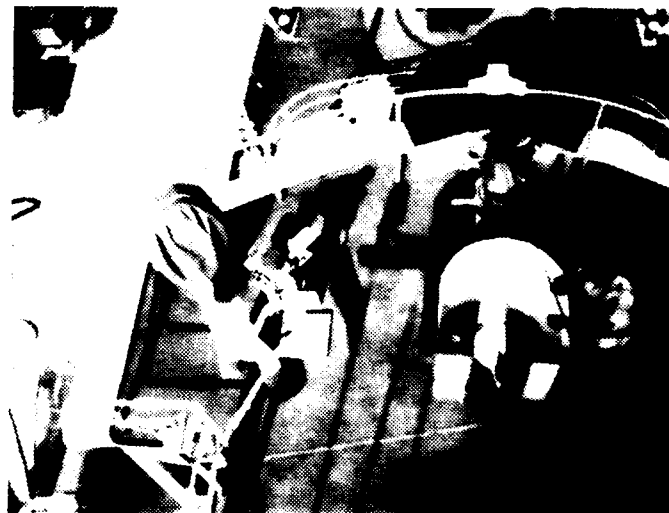


FIGURE 3. Installation of an AN / KAS-1 FLIR Sensor on  
Flying Bridge of CGC *Decisive*

Power Line Conditioning Apparatus assembled by R&DC for protecting apparatus from line transients

NVS-500 Monocular Night Viewing Intensifier for visual light observations

Apparatus Set No. 1 was used at Avery Point to observe the laboratory's 42 ft UTB at various ranges in Long Island Sound.

Apparatus Set No. 2 was placed on the flying bridge of the CGC VIGOROUS as shown in Figure 1. The sensor was at an elevation of 58 ft. Sizes of targets in reticle units were recorded by the crew. These measurements could have been converted to ft units.

The sensor of Apparatus Set No. 3 was placed on the flying bridge of the CGC DECISIVE as shown in Figure 3. Its elevation was also 58 ft. The remote control box, microphone, and speaker were located in the bridge as shown in Figure 4. The tape recorder, time code generator, and power conditioning assembly were placed in a relay rack assembly on the floor in the rear of the bridge as also shown in Figure 4. Stadiametric measurement of target size was not employed.

### 3.4 Test Locations

Locations for the tests performed with the three apparatus sets were the following:

Apparatus Set No. 1 was tested with a largely over water path on the eastern end of Long Island Sound.

Apparatus Set No. 2 was tested on the March-April 1987 cruise of the CGC VIGOROUS. Tests were performed on passages



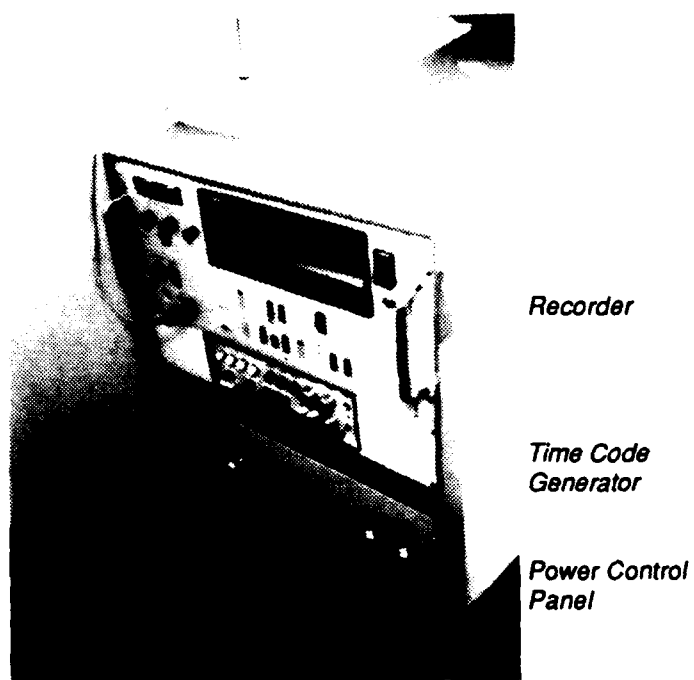
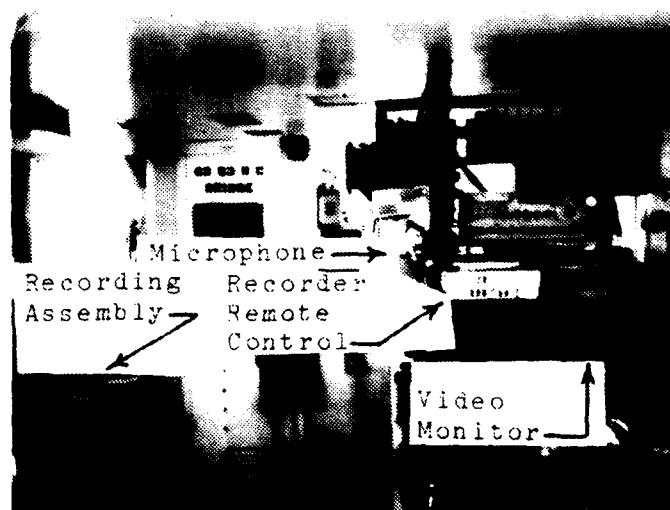


FIGURE 4. Installation of Video Equipment on Bridge of CGC *Decisive*

from Groton to Miami to the Bahamas to Haiti to the Bahamas to Portsmouth to Nova Scotia to New London. Details of the Groton to Miami passage are given in the narrative account of Appendix A.

Apparatus Set No. 3 was tested on the May-June 1987 cruise of the CGC DECISIVE. Tests were performed on passages from St. Petersburg to the Gulf of Mexico to Puerto Rico to Martinique to the Caribbean to St. Petersburg. Details of the St. Petersburg to Puerto Rico passage are given in the narrative account of Appendix B.

#### **4.0 MEASUREMENTS OF PERFORMANCE**

##### **4.1 Shore-based FLIR Observations**

###### **4.1.1 Observation of Details**

A set of shore-based inspection tests was performed to indicate the performance of the FLIR apparatus under optimum conditions. For these, elements of Apparatus Set No. 1 were used. The tripod-mounted AN/TAS-6 unit was located in the R&DC at an altitude of 90 ft and 800 ft from the shore of Long Island Sound. The target was the laboratory's 42 ft UTB, which was taken to ranges of 4, 3, 2, 1, and 1/2 nmi and was deployed at a variety of target angles. Observers using the FLIR noted apparent height and width values of the boat in reticle units and any activities on board the UTB. Target range was obtained separately with the laser ranging device.

Ambient conditions for the first three sorties are given in Table II. The corresponding activities observed on the boat and measurement accuracies are given in Tables III.A and III.B. From actual measurements one observes that lengths are determined with satisfactory accuracy, but cabin heights are typically overestimated--perhaps because of the presence of a small mast and radar unit mounted on the cabin.

TABLE II AMBIENT CONDITIONS

Sortie and Date	Time	Wind Speed (kt)	Sig. Wave Ht(ft)	Cloud Cover (%)	Visib. (nmi)	Air Temp. (deg F)	Water Temp. (deg F)	Precip. Water/mi* (mm)
1;02/04	0945- 1140	9-12	1	45	10-15	43	41	12.5
2;02/13	1330- 1500	3-5	<1	100	10-15	34	39	9.5
3;03/26	1930- 2100	0-5	0	00	05(in haze)	46	42	12.9

\* Precipitable water per mile is the thickness of liquid water which would result if the absolute humidity in the air was condensed in a sheet. This factor, pertinent to the transmission of infrared radiation will be used later.

TABLE III.a  
SHORE-BASED OBSERVATIONS OF 42 FT UTB

Sortie No.	Range (yd)	Object or Action Seen
1	7,250	Pilot house and mast
1	4,900	Man or crane on deck
1	3,000	Man on deck
1	1,700	Man on deck; crane arm; hay bale thrown overb.
1	900	Arms, hands of men on deck
2	3,000	Man on deck
2	1,600	People on deck; 2 persons sitting on stern; hay bale thrown overboard
2	800	Flag, radar, hand rails, people on deck
2	400	Man using a binocular
3	4,300*	Boat wake
3	2,000*	Man walking on deck
3	1,070*	Men seated on stern; flag

\* Using 3X (rather than 9X) magnification

TABLE III.b  
ERRORS IN SHORE-BASED MEASUREMENTS OF 42 FT UTB

Sortie No.	Boat Length Std. Dev. (ft;%)	Boat Cabin Height Std. Dev. (ft;%)
1	1.5;04	8;80
2	03;07	4;40
3	03*;07	12*;120

\* Using 3X (rather than 9X) magnification

The Sortie No. 1 observer was BM2 Ensminger, who was completely familiar with the UTB, having served as its cox'n. The No. 2 and No. 3 observer was SN Meaney, who had served on the boat, but was not so familiar with taking measurements.

Examples of the quality of shore-based images are presented in the prints of Figures 5.a to 5.h. The observer of an actual image perceives somewhat more detail, since he can compare several images, and the images do not suffer the loss of detail occurring with photographic reproduction.

#### 4.1.2 Search with the FLIR

Search was performed only from a land sight, since having adequate resolution required use of the narrow field of view, and operators of apparatus aboard the moving ships were able to perform a search only with the wide field of view. With the land-based searches Apparatus Set No. 1 was used at an altitude of 55 ft above sea level. The operator scanned the sensor continuously in azimuth over an angle of 90 deg in about 3 1/2 minutes. Scanning was in one direction only and scans were repeated until the target was detected. With the elevation angle set to just bracket the horizon, it was not necessary to scan the instrument in elevation. With the 9X magnification used, the field of view at this elevation covered ranges from about 1000 yd to the horizon.

When each search began, the target, the lab's 42 ft UTB, proceeded from a greater-than-detectable range toward the observer at a speed of about five knots. The target range was measured when detection occurred.

Search conditions are given in Table IV.

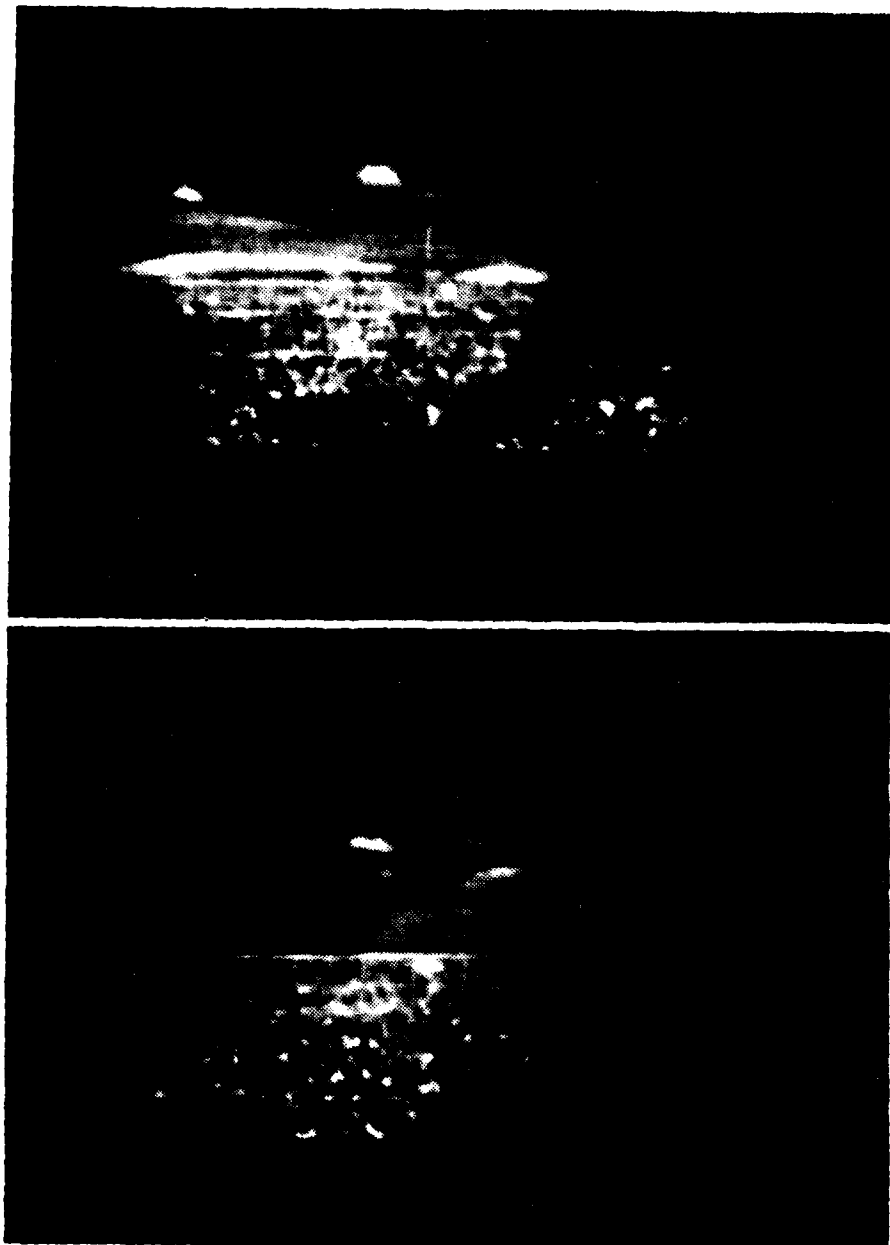


FIGURE 5a. Bow and Beam Images of UTB at 8,600 Yard Range — Sortie No. 1

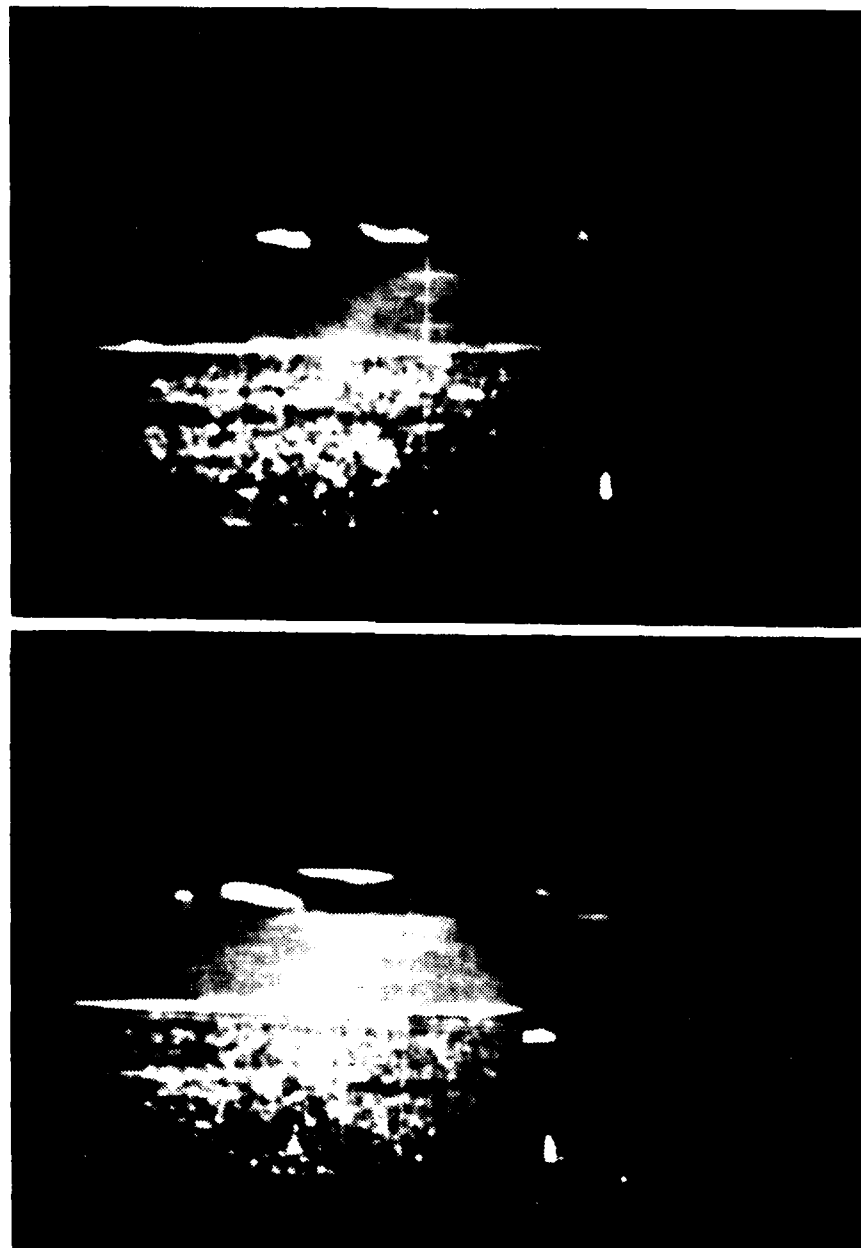


FIGURE 5b. Bow and Beam Images of UTB at 5,800 Yard Range — Sortie No.1

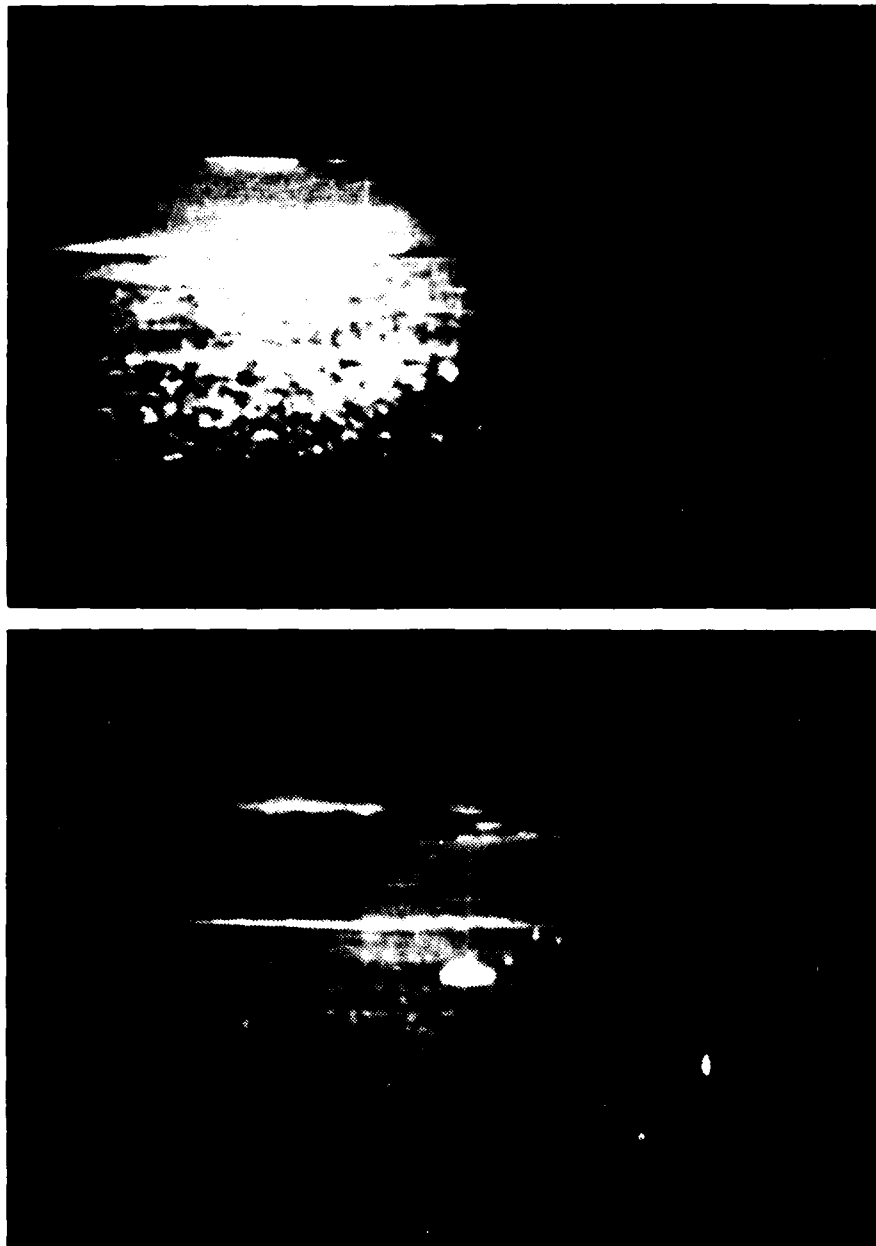


FIGURE 5c. Bow and Beam Images of UTB at 3,800 Yard Range — Sortie No.1



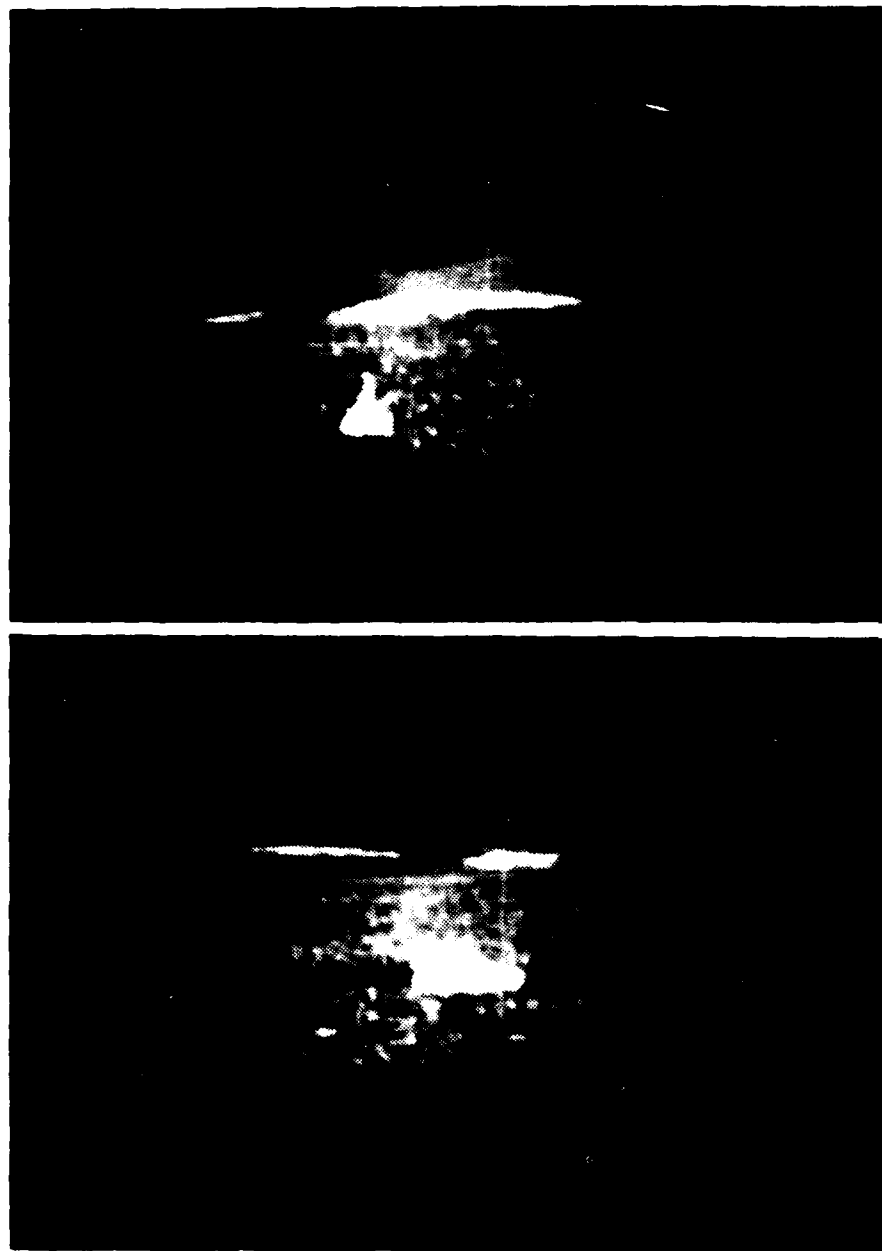


FIGURE 5d. Bow and Beam Images of UTB at 2,000 Yard Range — Sortie No. 1

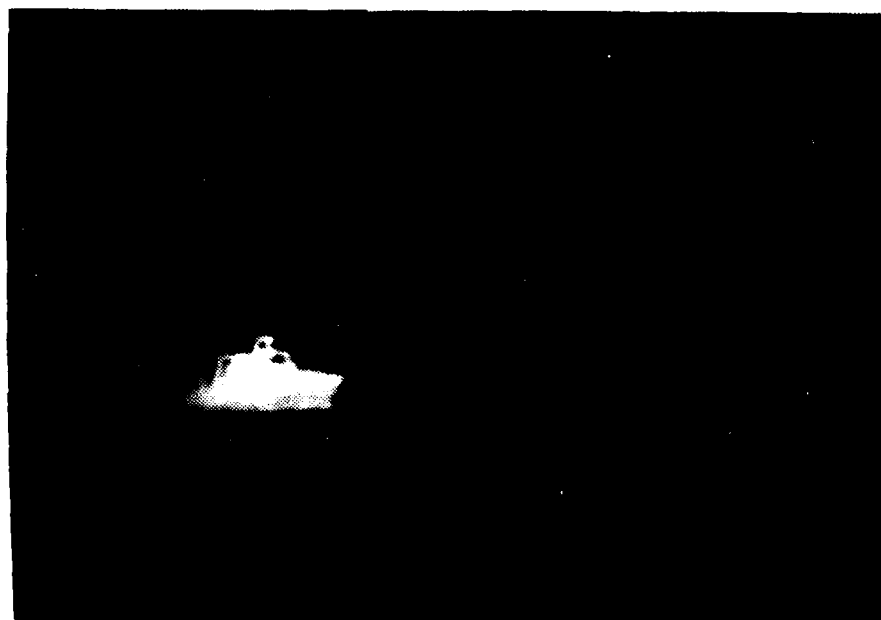


FIGURE 5e. Quarter Image of UTB at 900 Yard Range — Sortie No. 1

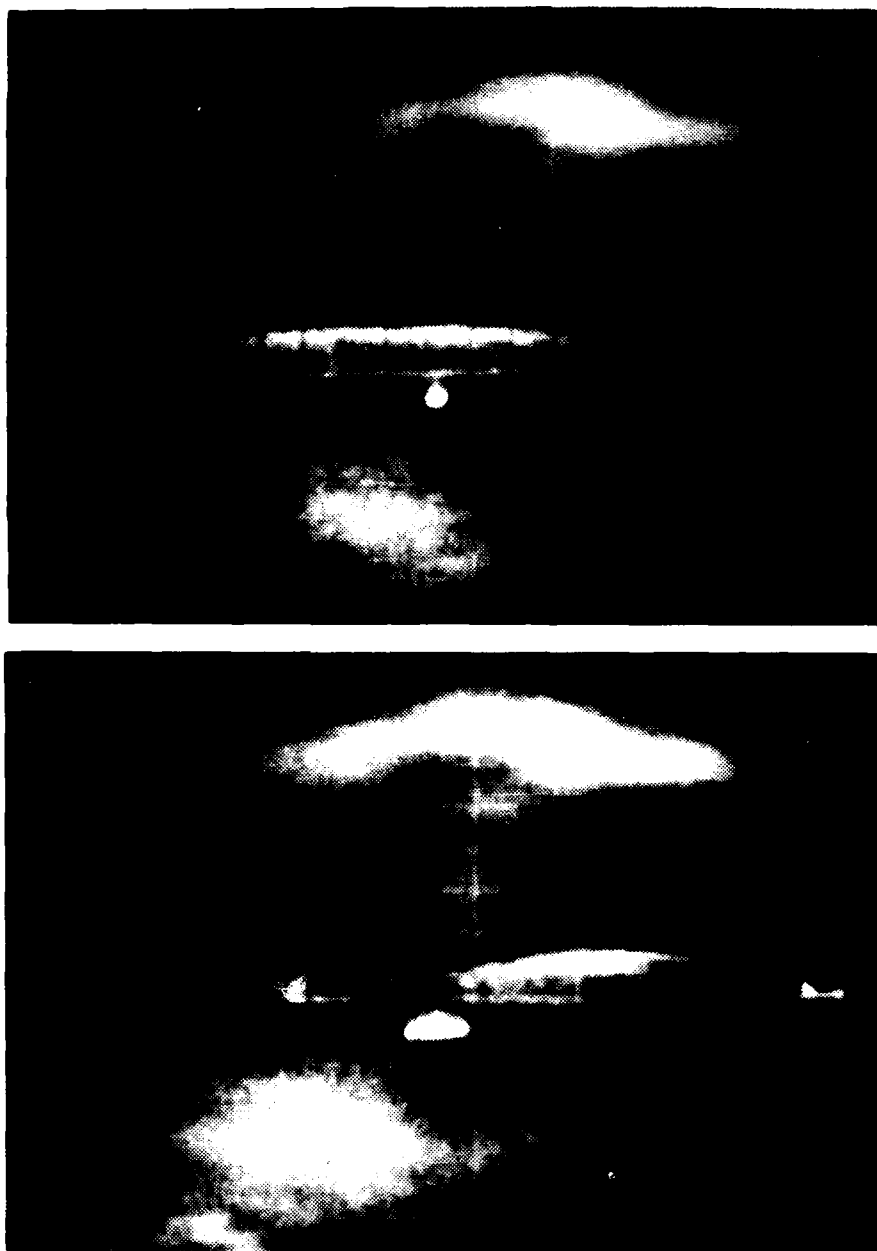


FIGURE 5f. Bow and Beam Images of UTB at 5,400 Yard Range — Sortie No. 2

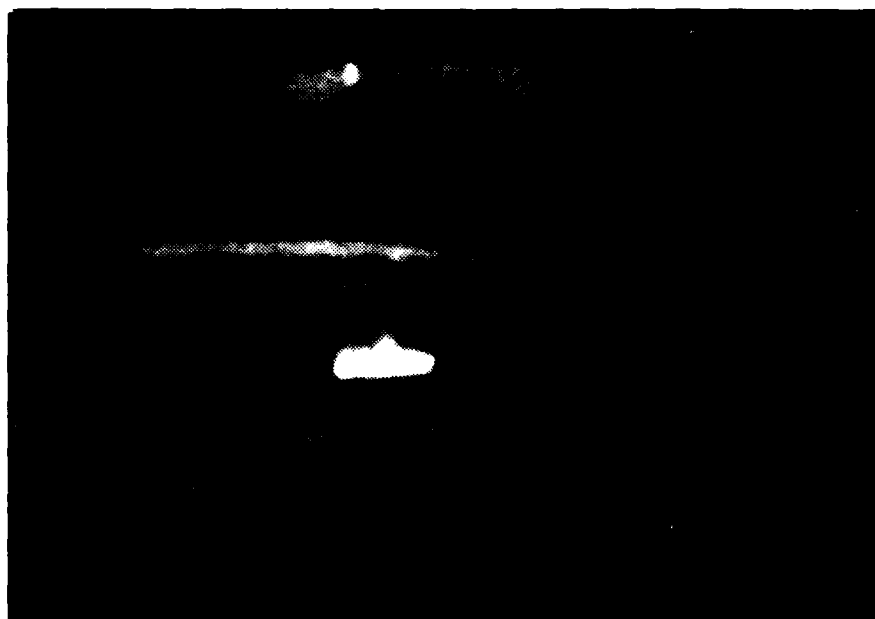


FIGURE 5g. Beam Image of UTB at 3,400 Yard Range — Sortie No.2

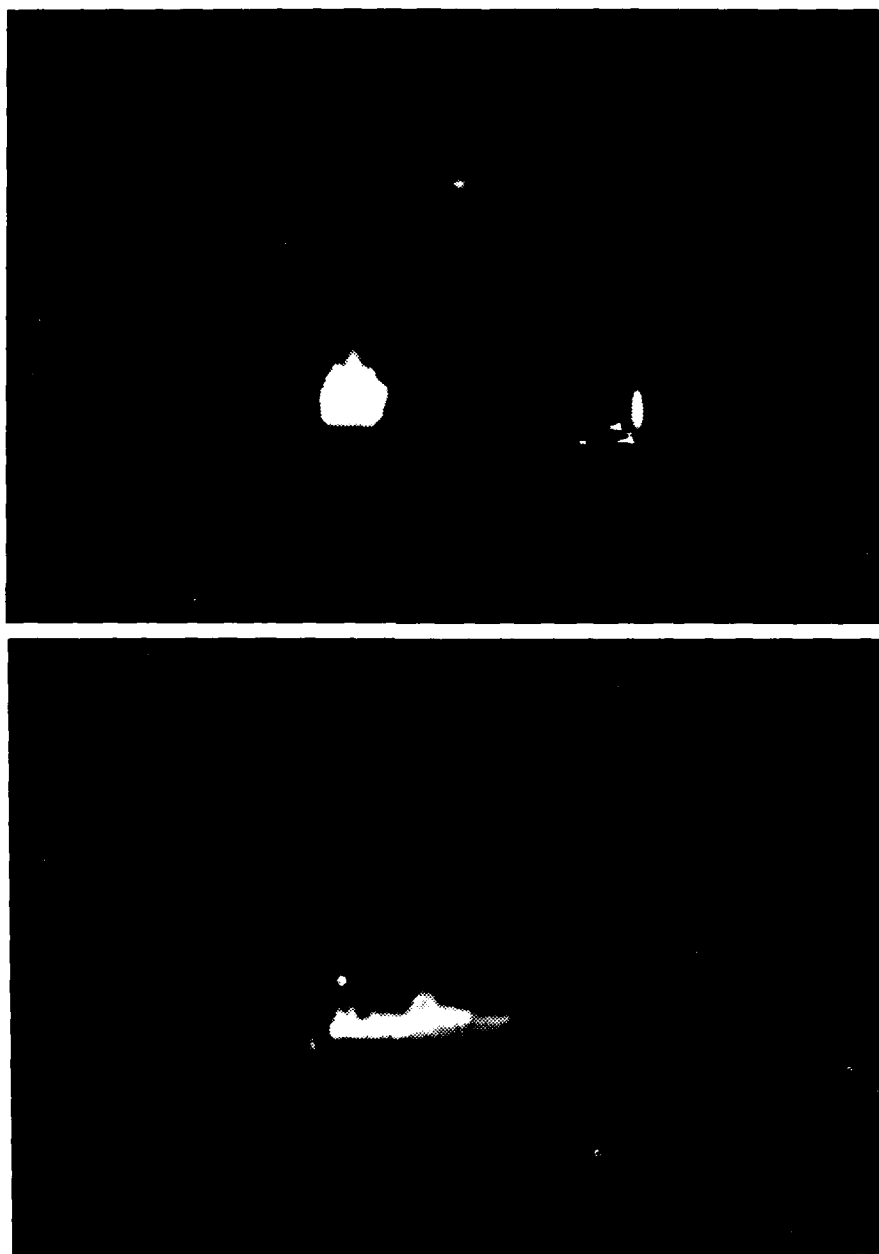


FIGURE 5h. Bow and Beam Images of UTB at 3,800 Yard Range — Sortie No. 2

TABLE IV  
SEARCH AMBIENT CONDITIONS

Search Number	Date	Time	Wind Speed(kt)	Sea State	Visib. (nmi)	Relative Humid. (%)	Air Temp. (°F)	Cloud Cover
1	6/30	2155	2	1	07	94	70	7/8
2	6/30	2220	4	1	10			
3	6/30	2230	4	1	10			
4	6/30	2255	4	1	10			
5	7/1	2110	6	0	06	95(est)	68	8/8
6	7/1	2130	2	0	06			
7	7/1	2150	4	0	06			
8	7/1	2205	4	0	06			
9	7/1	2225	4	0	06			
10	7/1	2250	4	0	06			

With this search procedure, detection might have occurred at a time up to one scan period earlier if the scan had begun at another azimuth angle. On the average, assuming that the target would have been detectable, the detection would have occurred one half scan time earlier. The third, fourth, and fifth columns of the table following assume that the limiting detection range should be increased by the range travelled by the target at a speed of five knots in this time interval.

Detection results and precipitable humidity values are given in Table V.

TABLE V  
DETECTION RESULTS AND PATH HUMIDITIES

Search & Observer Numbers	Detection Range (yd)	Range 1/2 Scan Earlier(yd)	Target Width (mrad)	Target Height (mrad)	Precip. Water/mi (mm)
1;1	6160	6430	0.73	0.52	31.7
2;2	6470	6850	0.68	0.49	31.7
3;1	4620	5000	0.93	0.67	31.7
4;2	3870	4040	1.16	0.83	31.7
5;3	6370	6620	0.71	0.50	31.6
6;4	4340	4640	1.01	0.72	31.6
7;5	6390	6700	0.70	0.50	31.6
8;3	5030	5340	0.87	0.62	31.6
9;4	4670	4990	0.94	0.67	31.6
10;5	1990	2460	1.90	1.36	31.6
Mean;	4990;	5310;	0.96;	0.69;	31.6
Std. Dev.	1430	1400	0.37	0.26	

Observers were as follows:

- 1 SN A. Depaolo
- 2 MST3 P. Reilly
- 3 MST3 C. Weiller
- 4 MST2 D. Hutchinson
- 5 SA E. Daly

It should be noted that the search field of view contained confusing objects (buoys, rocks, and other boats), causing a few seconds delay in setting on the true target. The 42 ft UTB was distinguished from other objects by noting its size and its motion in the field of view.

## 4.2 Ship-based FLIR Observations

### 4.2.1 Ambient Conditions

Ambient conditions are given in detail in the FLIR and meteorology logs reproduced in Appendices C and D. Ambient parameters for the cruises of the VIGOROUS and the DECISIVE made at the times of FLIR observations are summarized in Tables VI.a and VI.b.

TABLE VI.a  
AMBIENT PARAMETERS FOR VIGOROUS CRUISE

Parameter	Extreme Values
Wind Speed(kt)	2-28
Wind Direction	Variable
Sig. Wave Ht.(ft)	0.5-8
Pitch and Roll(deg)	0-3 (30 days); 4-10 (6 days)
Visibility(nmi)	2-10 (typically 10)
Air Temperature(F)	39-83
Prec. Water/mi(mm)	10.8-39.6

Precipitable water values for the VIGOROUS cruise are plotted at the end of Appendix D.



TABLE VI.b  
 AMBIENT PARAMETERS FOR DECISIVE CRUISE

Parameter	Extreme Values	Mean Value	Std. Dev.
Wind Speed(kt)	6-18	11.8	3.5
Wind Direction	East Quadrant		
Sig. Wave Ht.(ft)	2-5	3.4	1.2
Pitch(deg)	0-4	2.0	1.2
Roll(deg)	0-10	3.0	2.9
Visibility(nmi)	9-10		
Air Temperature(F)	80-83		
Prec. Water/mi(mm)	40.9-46.3	42.8	1.8

#### 4.2.2. Maximum Classification Ranges for Large Vessels

The plots of Figures 6 and 7 show maximum ranges for large vessels vs. precipitable water/mile. The data points present the maximum ranges logged for the various contacts.

#### 4.2.3 Maximum Ranges for Observation of Details

Figures 8, 9 and 10 show similarly obtained maximum ranges for fishing and sailing vessels and for deck rigging. Identification of these types of ships and of deck rigging represents a significant sensing of detail by the observers. Unfortunately the number of observations in the three categories made under widely varying humidities is less than would be desired.

#### 4.2.4 Maximum Ranges in Low Temperature Fogs

A set of twelve observations from the FLIR log of the VIGOROUS cruise illustrate the performance of the FLIR in low temperature fogs. They are reproduced as Table VII.

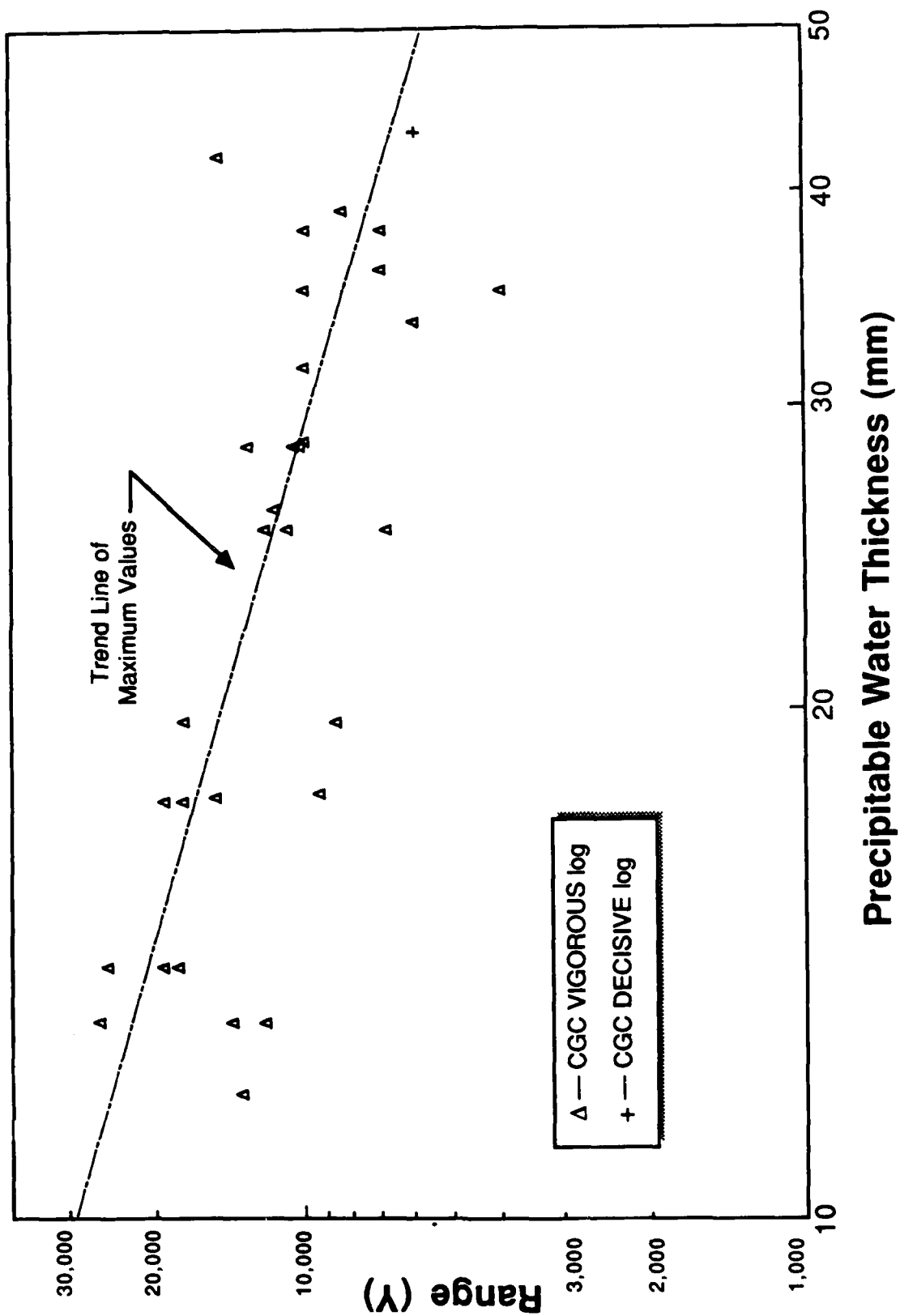


FIGURE 6. Maximum Observation Ranges for Freighters

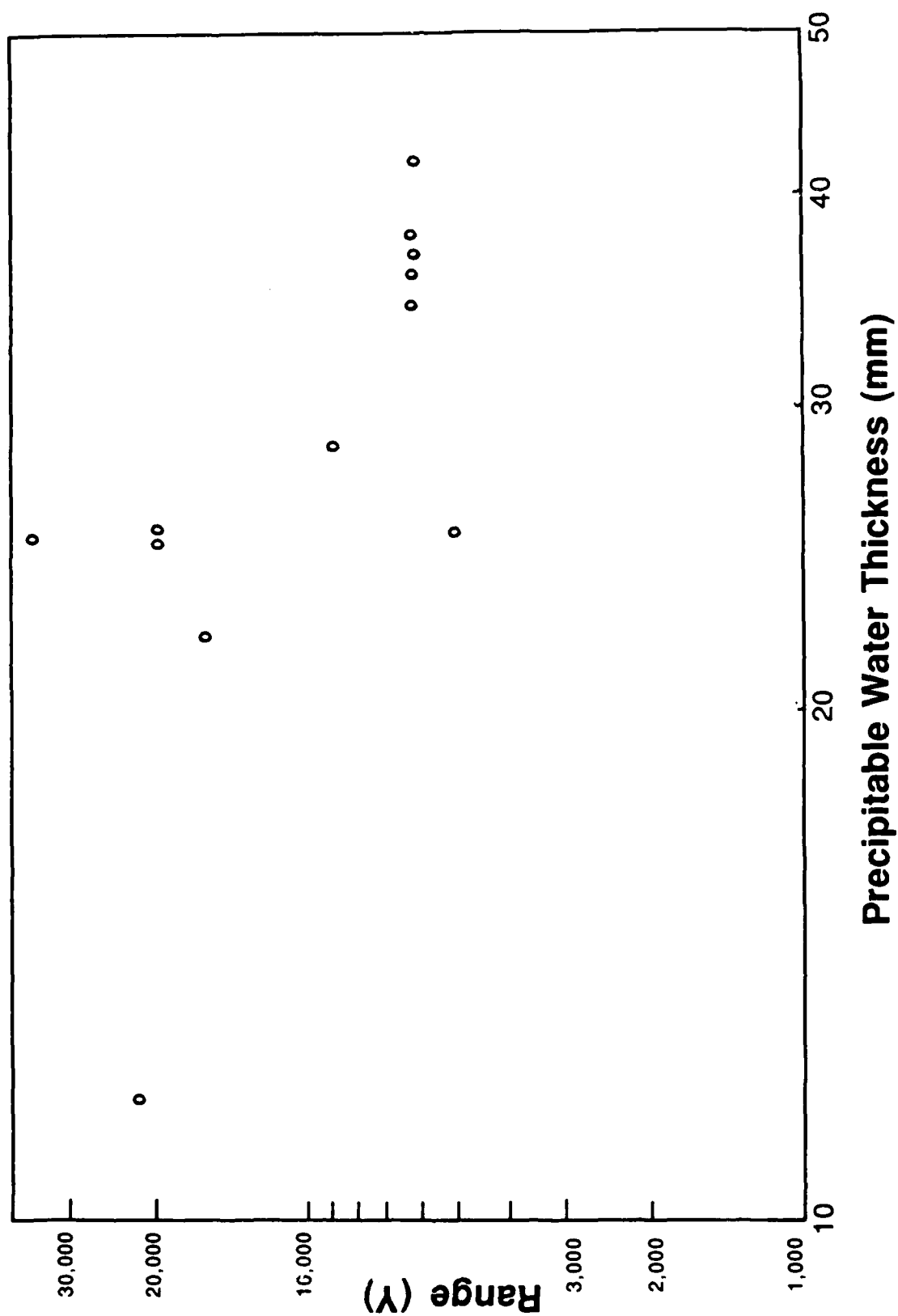
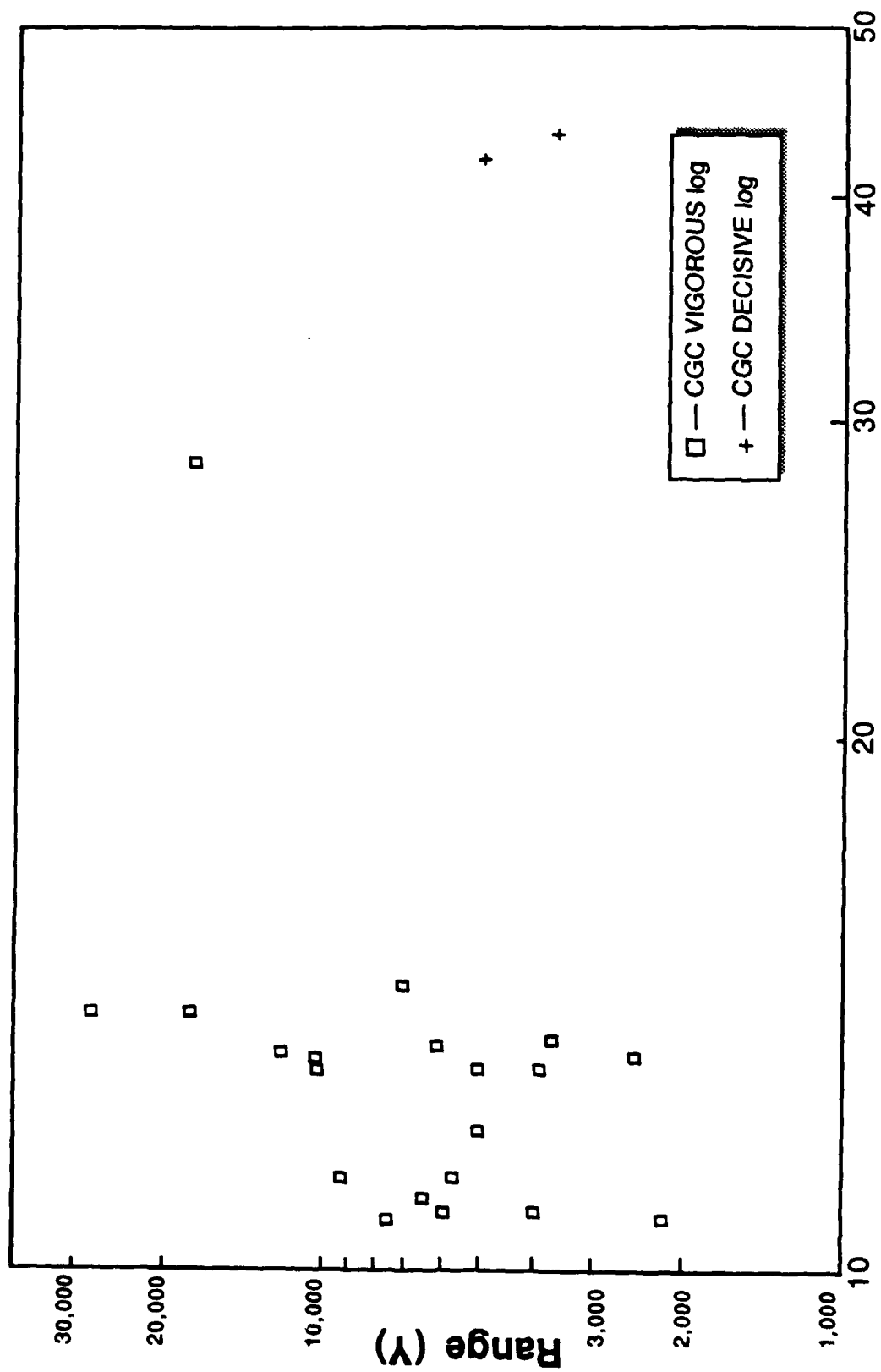


FIGURE 7. Maximum Observation Ranges for Tankers — from CGC Vigorouslog



**Precipitable Water Thickness (mm)**

**FIGURE 8. Maximum Observation Ranges for Fishing Vessels**

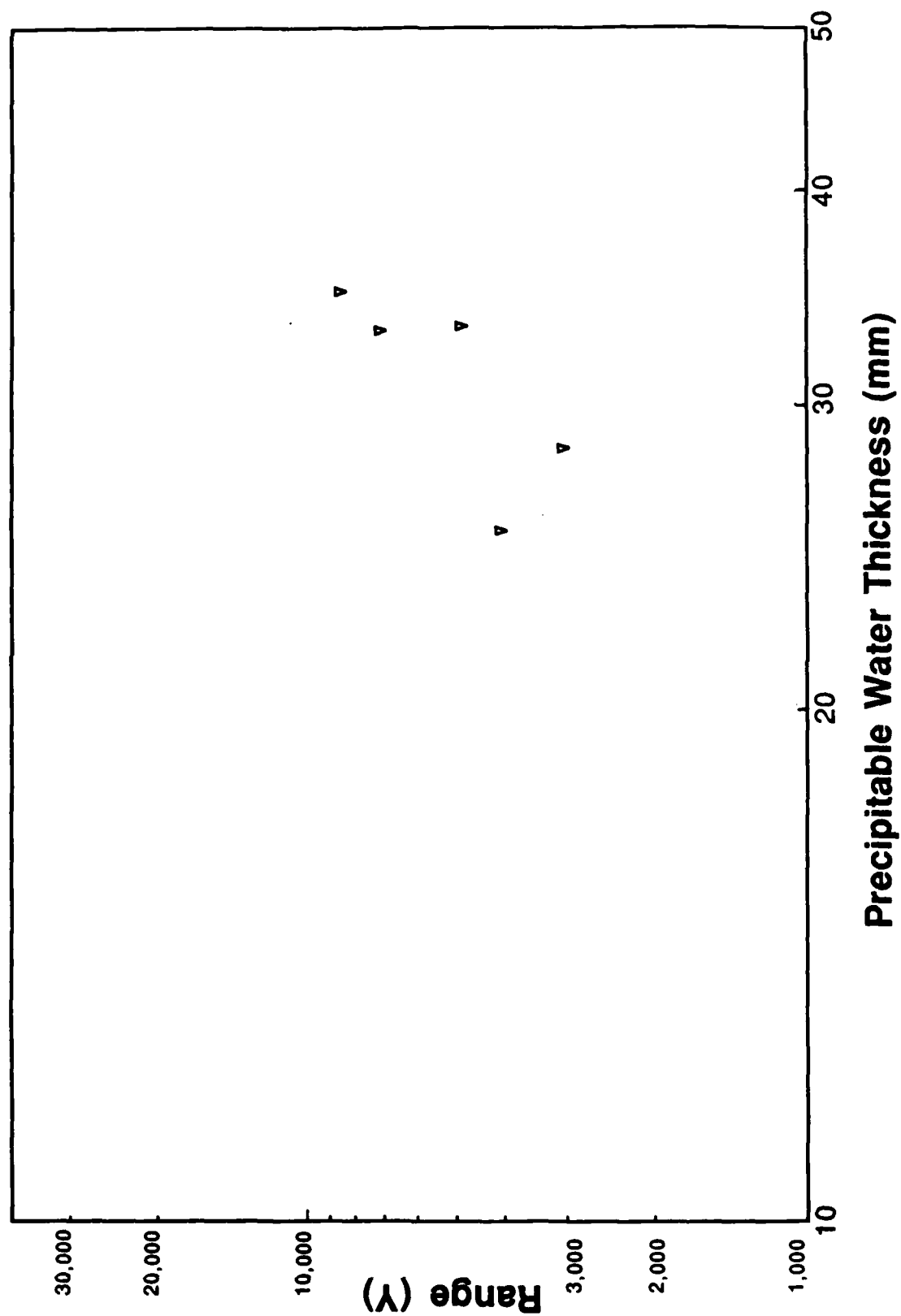


FIGURE 9. Maximum Observation Ranges for Sailing Vessels — from CGC Vigorous log

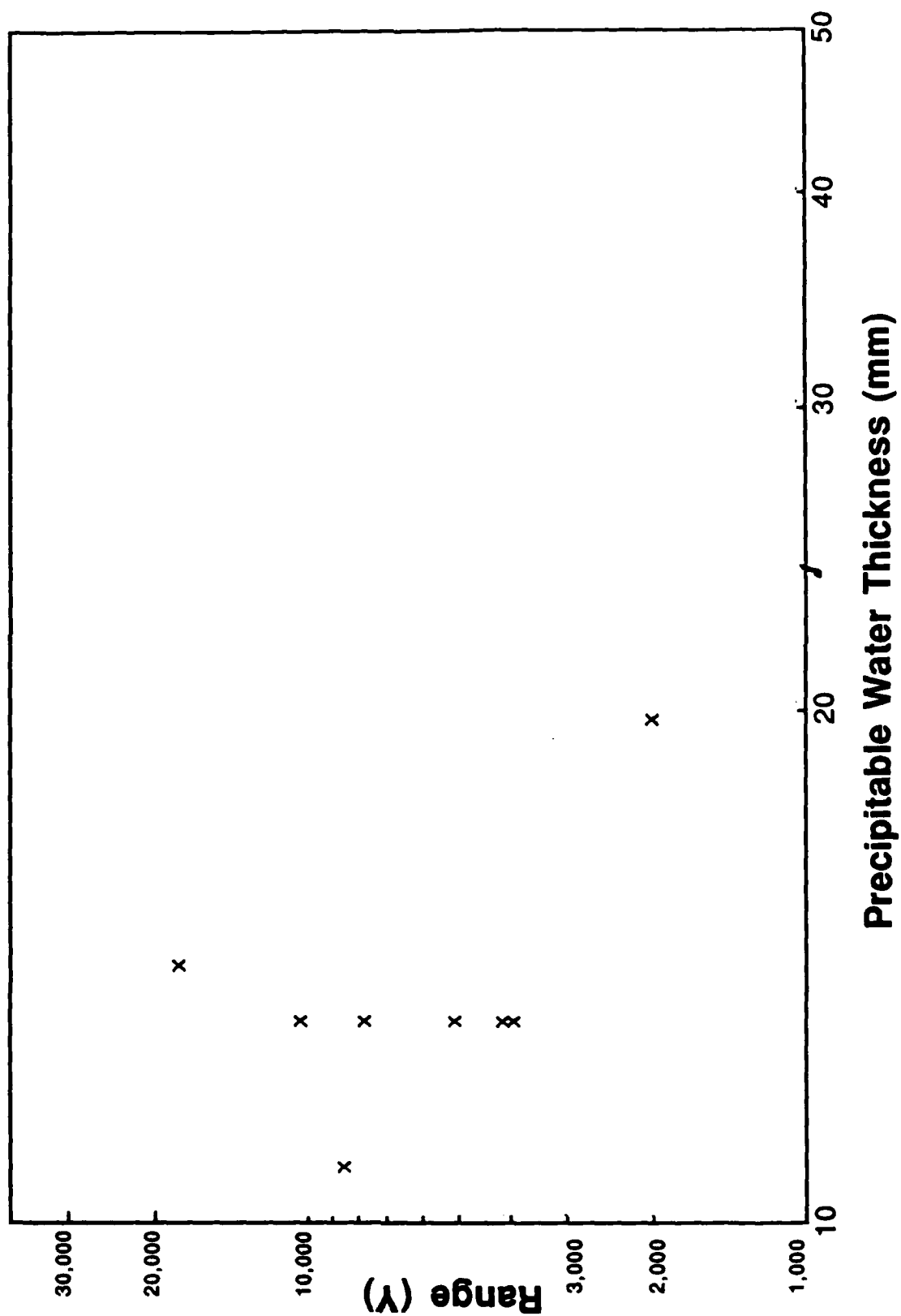


FIGURE 10. Maximum Observation Ranges for Deck Rigging — from CGC Vigorous log

TABLE VII  
FLIR OBSERVATIONS MADE IN FOG

Date	Time	Air Temp.	Visib. (nmi)	Radar Range(yd)	Ship Type	Observations
4/5	1307	47 F	5	18,000	Frtr	Faint hull outline
4/5	1505	47 F	7	10,000		Only stack visible
4/5	1900	43 F	1/4			Only VIGOROUS bow vis.
4/6	2045	40 F	2	2,000	CGC VIGILANT	"Decent" FLIR image; Only stern light vis. with Big Eyes
4/6	2125	40 F	6	6,400	CGC VIGILANT	Good profile
4/6	2125	40 F	6	4,000	Fishing Vessels	Heat from lights and stacks
4/6	2145	40 F	8*	10,000	CGC VIGILANT	Slight profile
4/6	2245	41 F	9*	3,700	Stern Trawler	"Decent" image
4/6	2245	41 F	9*	22,000	Tanker	Strong image of stack and superstr. ;no hull
4/6	2300	41 F	10*	12,000	Tanker	Hull appears faintly
4/8	2205	39 F	8	2,210	Fishing Vessel	Superstr., rigging, hull visible
4/10	2208	47 F	9	10,000	Trawler	Rigging, superstr. visible

\*Estimated from log data

#### 4.2.5 Quality of Images--Video Recordings

The quality of images recorded on the DECISIVE cruise can best be judged by seeing the two 3/4 inch VCR tapes included with this report and listening to the audio commentary on the tapes. These tapes comprise a set of samples from the set of seven original tapes recording test signals and at-sea observations. They shorten the observation time required by omitting periods of inconsequential activity or of little change in the scene. The narrative report of Appendix B provides additional details about the action taking place on the tape recordings.

#### 4.2.6 Tests of the "2X-Extender" Magnifier

A lens assembly giving an additional 2X magnification (but no additional scan lines) was provided for the first leg of the DECISIVE cruise by Texas Instruments. Its effect may be seen on portions of the video recordings--from 19 May--2043 hrs to 20 May--2050 hrs. The only conclusion reached about its operation was that it cannot be used easily on an unstabilized mount because of the increased image motion which it generates. It might well be useful on a stabilized sensor for increasing the detail in clearly defined images. It cannot, of course, increase the contrast present in images.

#### 4.3 Inspection with the NVS-500 Night Sight

Robert Barry recorded two trials of the Night Sight in Appendix B, saying that, "The recorder was started at a range of 1400 yards. I examined the contact with the NVS-500, but the anchor light and a light on the starboard side prevented seeing details until the boat was close aboard."--and--"Good detail on FLIR. NVS-500 image masked by lights; the outriggers were the dominant feature that was clear."



This effect was confirmed by a DECISIVE crewman who added that the night sight was useful for detecting glows from ships over the horizon or for looking at unlighted ships, but it was not useful for inspecting ships carrying lights.

#### 4.4 Operator Image Stabilization and Eye Fatigue

##### 4.4.1 Short Term Stabilization

Observations of the video recordings from the Vigorous cruise show that sensor operators were able to stabilize images to within peak-to-peak angles of about four milliradians when the ship's roll or pitch was of the order of two degrees (35 mrad). When ship motion increased to a maximum value, the stabilization was accomplished to within about 13 mrad. According to the operators, manual stabilization and operation become difficult to impossible when ship pitch and roll values exceed about ten deg.

##### 4.4.2 Eye Fatigue

The crews of the VIGOROUS and the DECISIVE indicated that the longest period which an operator could concentrate on an image is of the order of five to ten minutes. Then his eyes must be averted to reduce fatigue. For this reason search (and stabilization) by a single operator was difficult.

#### 5.0 RANGE AND RESOLUTION LIMITATION THEORY

##### 5.1 Range Limitations

In the transmission of IR radiation from a target to an observing device, the target radiation is absorbed and scattered by the intervening atmosphere, and spurious radiation from the background is scattered into the line of sight. This effect is similar to the effect observed with visible light. It leads similarly to a loss of image contrast and a consequent loss of

the ability of the observer to detect and/or identify a target. This loss of contrast has been described mathematically by Koschmieder's Law in an early report and further developed by Duntley (Reference 1). Their contrast loss equation is simply

$$C(R) = C_0 \exp[-a(\lambda) R],$$

where

$$C = \frac{\text{(radiance of target-radiance of background)}}{\text{radiance of background}}$$

$$C(R) = \text{image contrast at the receiver at a range } R \text{ from the target}$$

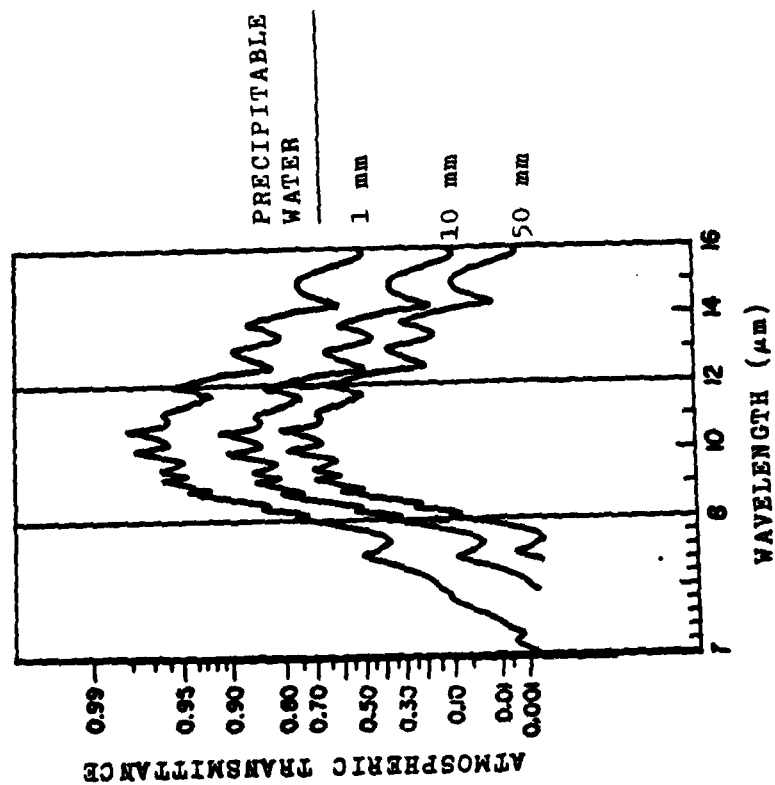
$$C_0 = \text{contrast at zero range}$$

$$a = \text{rate of attenuation of contrast by absorption or scattering, and}$$

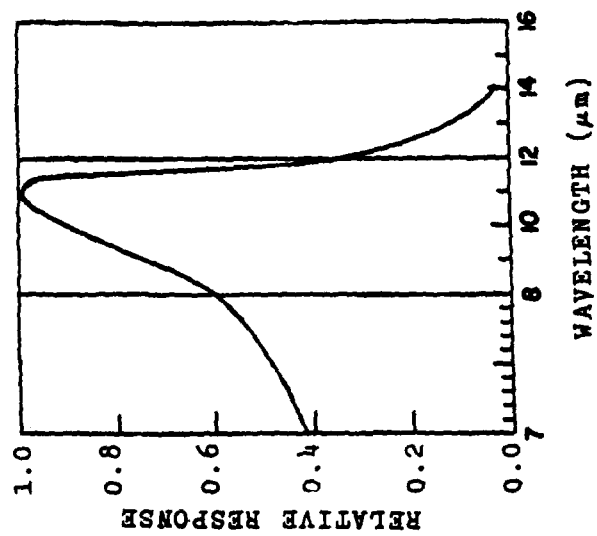
$$\lambda = \text{wavelength of the radiation.}$$

$$R = \text{range from the target}$$

In our case the attenuation of long wavelength IR radiation can result from absorption by water molecules in the atmosphere or by scattering and absorption by droplets (haze or fog). Figure 11.A is a plot of the absorption (actually transmission) characteristics of the atmosphere vs wavelength for humidity concentrations of 1, 10, and 50 mm of precipitable water. Figure 11.B is a plot of target emission combined with the response of the detectors used in the FLIR. One notes that the effect of increasing path water vapor is to reduce significantly the composite response (product of values on Figures 11.A and 11.B).



A. Transmission through Atmospheric Water Vapor  
(Data are from Ref. 2)



B. Combined Relative Response from Target Emission and FLIR Detector

FIGURE 11.

The absorption of IR radiation by water vapor across the transmission band varies almost proportionally with its concentration and to a lesser degree with temperature\*. In typical conditions at sea the atmospheric relative humidity varies between 75 and 100 percent. To provide bogey values for the expected absolute humidity vs temperature, we have calculated the precipitable water/mile vs temperature for a nominal relative humidity of 85 percent. This is graphed in Figure 12. Then, in a non-foggy condition, the attenuation rate for IR radiation is approximately proportional to the precipitable water/mi, which is relatable to ambient temperature as in Figure 12. It remains to determine the proportionality coefficient, or, alternatively, to find the thickness of precipitable water at which a target can just be detected. This latter is done in a "Conclusions" section of the report.

## 5.2 Resolution Limitations

The resolution achievable with electro-optical apparatus is a thoroughly studied subject. For us a study by Johnson (Reference 3) of the US Army Engineering Research and Development Laboratory is particularly applicable. Johnson found that for a set of nine types of army targets (vehicles, tanks, guns, soldiers) the number of TV lines (resolution elements) required for determining target details in a display were as follows:

---

\*The subject is appropriate for further study, particularly to ascertain what increases in range can be achieved by changing the wavelength response of the detector in order to maximize radiation from a target and minimize line of sight absorption and scattering.

Action	TV Lines/ lesser dimension*	FLIR NFOV Angle (mrad)
Detection	$2.0 \pm 0.5$	$0.3 + 0.1$
Orientation	$2.8 \pm 0.7$	$0.4 + 0.1$
Recognition	$8.0 \pm 1.6$ (class of object)	$1.3 + 0.3$
Identification	$12.8 \pm 3$ (type in class)	$2.0 + 0.5$

\* Lesser dimension is height of vehicle, width of man, etc. In our case it is height of ship.

To the tabulation we've added a third column giving the corresponding field angles in the common module FLIR in NFOV mode. Johnson's test conditions were:

1. High signal/noise ratio
2. High target/background contrast
3. No target motion
4. No background clutter

In our case with the common module FLIR operating in the narrow field of view, the 8 and 12.8 TV lines subtend field angles of 1.3 and 2.0 mrad (8 and 12 ft at one mile) respectively. These values will be compared with requirements in the section describing "Conclusions."

#### 6.0. USERS' CRITICISMS

These were obtained from the final reports and from debriefings of the ship's personnel and the R&DC operators. Summaries are presented here.

### 6.1 Classification Range

VIGOROUS--"Up north contacts were picked up at great distances, up to 10 miles; FLIR generally did not pick up contacts well down south."

DECISIVE--"Outside Tampa Bay--the first ship observed was a 600 ft cruise liner.--Not until a range of approximately two miles was the ship identified by type with the FLIR."

--"Only on a very few occasions were any vessels visible through the FLIR at a range of over three miles.--- Between the latitudes of 15 and 12 degrees north we were not generally able to detect contacts farther than one mile."

### 6.2 Detail Observation Utility

VIGOROUS--Useful for picking up unlighted vessels at night. "The FLIR is a valuable tool when searching for a specific target since nighttime profiling and sizing is accomplished."

DECISIVE--"On the occasions that we closed a vessel for LE purposes the device--allowed us to observe vessel type and construction, monitor crew movement, and examine possible heat sources prior to illumination and boarding. Once the boarding was in progress, the FLIR became insignificant for that vessel."

### 6.3 Major Equipment Items

VIGOROUS--"A remote bridge monitor for periodic scanning by bridge personnel or red-lens screening for the normal lookout's periodic scanning would help circumvent manning restrictions."

Mounting the FLIR sensor on top of the Big Eyes binocular for convenience of the lookout (eliminating the need for another watchstander) was suggested.

Automatic detection of targets would be desirable.

Documenting of LE cases is necessary nowadays.

**DECISIVE**--"Resolution was a problem.--the video capabilities require too much space."

Real time observation was even more useful than recording.

#### 6.4 Minor Capabilities

##### **VIGOROUS**

The sensor image should be in red, rather than green, to permit the lookout to continue to be dark adapted.

The sensor stand should be stronger to reduce ship-induced vibration.

The sensor should be higher so that the obscuration is lessened.

##### **DECISIVE**

The time code generator should be easily settable and should have storage cell backup so that resetting would not be necessary after every power break.

Too much space was taken up by recording and control panels.

##### **R&DC**

The mount provided for the sensor by T.I. was defective in two ways. The tapered fitting used for quick release of the apparatus fitted poorly, allowing the apparatus to flop in its mount, instead of moving on well made bearings. Also the elevation yoke was sprung causing improper friction on the elevation bearings.

The viewer reticle should have only one cross-bar length to prevent confusion in ship size measurement when many operators use the viewer.

The optics and/or detectors associated with the video pickoff were loose and vibrated when the sensor was pointed at the horizon.

The connectors on the video cables were not durable for shipboard use--they were the BNC type.

A shield should have been provided to shield the infrared optics from spray in as far as possible.

The sensor's foam optics protector should have a positive lock in the operating position so that it will not be loosened by the air stream.

The apparatus manufacturer should provide the user with a simple thermal test device to verify its sensitivity and resolution.

## 7.0 CONCLUSIONS

### 7.1 FLIR Range Capabilities for Detection and Classification of Large Ships

If we assume that the "trend line" of Figure 6 represents the limiting range for classification of large ships, it would be instructive to predict the ranges obtainable at differing locations when humidity is the limiting factor. To do this, we selected fifteen offshore locations around the continental U.S. and in the Caribbean. For these we obtained mean July and January air temperatures. Then, assuming a bogey value of relative humidity of 85 percent, precipitable water per mile was obtained from Figure 12. With this as an input, we calculated mean maximum ranges for these locations. These are given in Table V<sup>II</sup>.



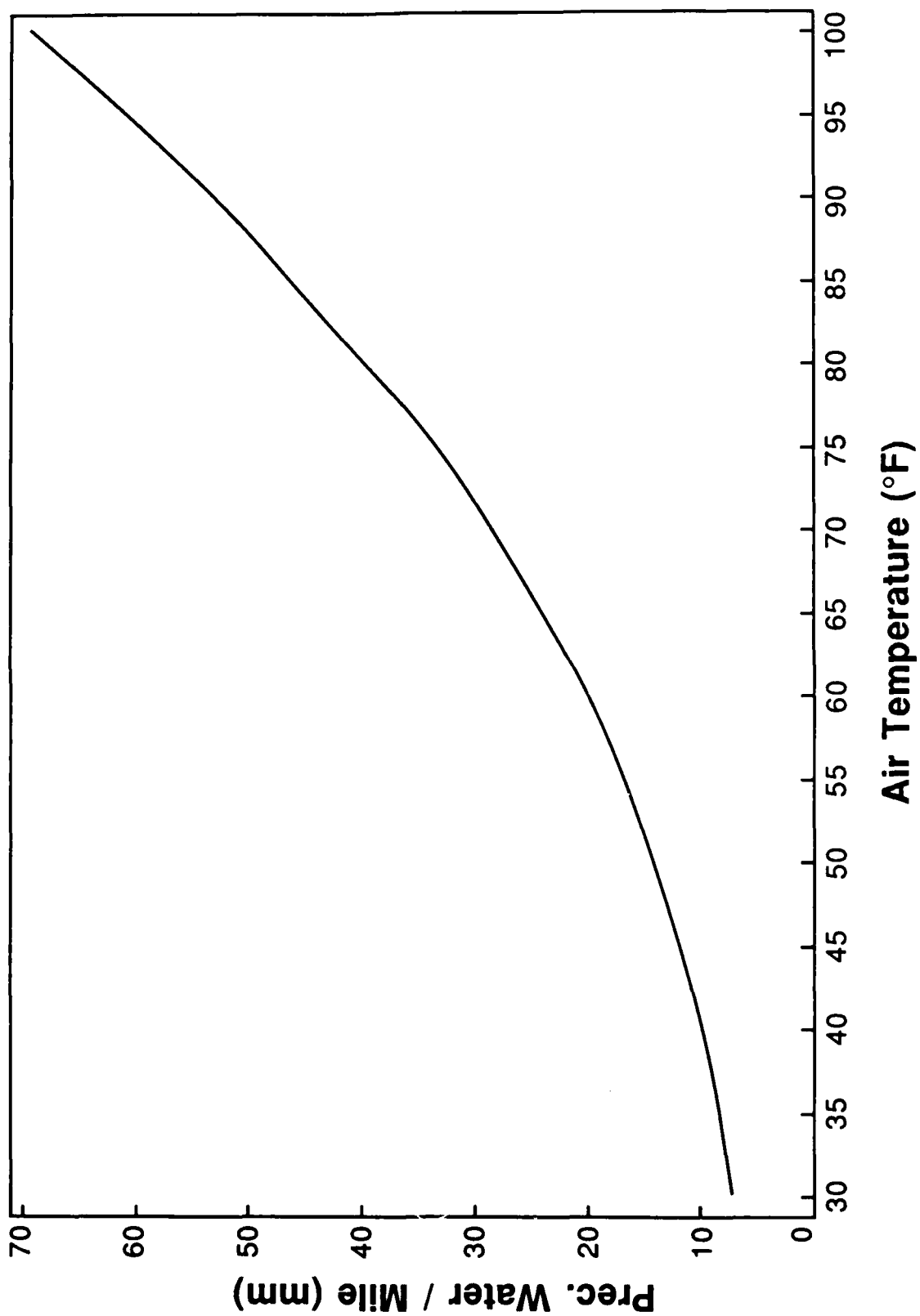


FIGURE 12. Precipitable Water/NM vs Ambient Temperature at 85 Percent Relative Humidity

TABLE VIII  
MAXIMUM EXPECTED LARGE SHIP CLASSIFICATION RANGES

Offshore Location (N.Lat,W.Long)	Jan. Mean Temp. (F)	July Mean Temp (F)	Jan. Max. Range (Yd)	July Max. Range (Yd)
<u>East Coast</u>				
44,68	31	55	40,000*	16,700
40,74	37	73	31,600	9,200
35,76	51	81	19,100	7,100
30,81	62	82	13,100	6,900
25,80	72	84	9,500	6,500
<u>Gulf of Mexico</u>				
25,90	71	84	9,800	6,500
<u>Caribbean Sea</u>				
20,70	78	83	7,800	6,700
15,65	79	83	7,600	6,700
<u>West Coast</u>				
34,119	56	65	16,100	11,900
40,125	51	57	19,100	15,600
45,125	47	60	22,000	14,000
49,126	43	56	25,400	16,100

\* Calculations are for a flat earth. This range would place the ship over the horizon.

From the projection data given in Table VIII we conclude that the requirement for a 10 mile detection of large ships will be met only for the winter half of the year at latitudes above  $40^{\circ}$ .

If the requirement is relaxed to a range of 5 nmi for detection, we predict that this will be possible year around for latitudes above  $40^{\circ}$  on the Atlantic Coast and  $30^{\circ}$  on the Pacific Coast.

Concerning resolution capability of the equipment--if we equate Johnson's "Recognition" requirement given in Section 5.2 with the resolution required for classifying ships as to type, his criterion would be met for ships having mean vertical subtenses (freeboard plus cargo or superstructure) of 26 yd at a range of 20,000 yd. Assuming that typical vertical subtenses for larger ships vary from 6 to 40 yd, meeting his criterion would require a viewer resolution of at least four times the present value. If we assume in our case that the crew can use the additional criteria of apparent ship length and strength of radar signal return for classifying ships, it would still be wise to select equipment having a vertical resolution two or three times that of the present equipment. One possibility for achieving this is to add an IR telescope (e.g., the "2X Extender").

Concerning the utility of FLIR observation in fogs--it is difficult to draw conclusions from the data of Table VII, since the information from which this was drawn did not give the density of fog occurring at the exact observation time. However, it is known that far IR transmission through nascent (small particle) fogs is superior to the transmission of visible light. This is borne out from a statement in the account of Appendix A, 6 March--0500 hrs, "Turned on FLIR to see how well it would work in light fog or haze that was showing along the shore. FLIR worked extremely well in this case. The Verrazzano Bridge was

hidden in fog except for the very top of the bridge towers. The FLIR showed all detail including vehicular traffic. Distance was about 4 miles. I requested the lookout on the Big Eye scope to describe various contacts for me so I could compare visual observations to FLIR. For the most part the FLIR 'saw' the same thing as the Big Eye except that the FLIR detail wasn't as great because of the difference in magnification. One instance where there was haze the Big Eye could not pick up both a tug and barge and could only identify the pair as a single unit."

## 7.2 FLIR Range Capabilities for Observation of Details

We will assume that the first degree of resolution of details occurs with the recognition that the ship is a fishing vessel. Unfortunately the number of data points for these is not as large as the number of data points for large vessels. However, one may conclude from the data of Figure 8 that ranges at which ships can be classified as fishing vessels under low and high humidity conditions vary from about 7000 yd at low humidities to 4500 yd at high humidities. Thus we can predict only two nmi range for classifying ships as fishing vessels under all conditions.

The data from Table V.b show that, at least for a stabilized mount, the apparent lengths of ships can be measured to within a few percent by using the viewer reticle and the range given by the ship's radar. Correcting this apparent length for the target angle should give the ship's length or its beam width to within (est.) 25 percent.

The second degree of resolution might be that the operator can sense the presence and motion of men on deck. The data from Table V.A, obtained from shore-based observations, show that the maximum range for sensing men on deck is about one nmi. At such ranges, the sensing of detail is primarily limited by the instrument's resolution. Thus this range should be nearly independent of ambient humidity.

### 7.3 Utility of the NVS-500 Night Sight and the "2X-EXTENDER"

As has been indicated, the present NVS-500 Night Sight is of very little utility--solely for inspection of unlighted targets.

Conclusions cannot be drawn about the use of the "2X-Extender" magnifier, since it could not be used easily on an unstabilized mount.

### 7.4 Stabilization Requirements

Judging by the image motion present in the video tape recordings made on the DECISIVE cruise, manual stabilization is suitable only for weather in which the ship roll and pitch is less than 5 degrees.

If an inertially stabilized mount is used, it would appear that stabilization to within 1.0 mrad rms is adequate for eye viewing of the monitor. If automatic target detection (electronic search) is to be employed, the stabilization error should not be over 0.2 mrad rms.

## **8.0 GENERAL RECOMMENDATIONS**

It would be possible to use the equipment in northern waters with reduced operating ranges. However, before the severe operating limitations indicated in this report are accepted, it is recommended that the following studies be performed:

1. Ascertain the improvement in range which can be achieved by use of wavelength selecting filters or by operating at another infrared wavelength.
2. If the results of study 1) are favorable, study possibilities of increasing instrument resolution, so that details of actions on deck can be perceived at ranges greater than 2,000 yd.
3. Study the requirements and cost of a stabilized mount.

4. Study means of automated search and detection
5. If the results of Studies 1.) through 3.) lead to an instrument producing a stable image with a good image signal to background noise ratio, study the possibilities of computer image enhancement.

A search should be made for visible light intensifier apparatus having less severe glare problems than does the NVS-500.

#### 9.0 OPERATOR REPORTS

Reports from the captain and crew of the VIGOROUS and the captain of the DECISIVE are included as Appendix E. Generally comments given in the reports have been included in the previous text.

#### 10.0 REFERENCES AND BIBLIOGRAPHY

1. S. Q. Duntley, "The Reduction of Apparent Contrast by the Atmosphere," Jour. of Opt. Soc. of Amer. 38, No.2, p. 179, Eq. 19, Feb. 1948
2. R.A. McClatchey, Notes in U.T.S.I. course on "Aspects of Atmospheric Optics," October, 1983
3. J. Johnson, "Analysis of Image Forming Systems" in Proceedings of Image Intensification Symposium of 1958, U.S. Army Eng., Research, and Development Lab., Ft. Belvoir, VA
4. L.H. Chen, W.B. Lincoln, and R.F. Dugan, "Coastal Surveillance," USCG R&DC Report No. CG-D-45-80, December 1980--Reports that "The AN/TAS-6 night vision device has good potential as a coastal surveillance device....."

APPENDIX A

REPORT OF FLIR OPERATION ON THE TRANSIT OF THE VIGOROUS  
FROM GROTON TO MIAMI

--Abstracted from Narrative Account composed by Bob Stachon--

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5 March----2000 hrs. Ens Dietrick conducted the briefing and explained what would be required of watch standers and look outs. It was decided to man the FLIR from 30 minutes after sundown to 30 minutes before sunrise. FLIR may also be used during times of low visibility at the OOD's discretion. Extra lookouts will be used for the FLIR; these personnel will be petty officers who normally don't stand watch. They will stand one 2 hour watch on a rotating basis. There will be 9 PO's for this purpose.

2100 hrs. demonstrated FLIR to lookouts and had a question and answer period. Shut down operations for the night. FLIR watch will start tomorrow night.

6 March\_\_\_0500 hrs. Turned on FLIR to see how well it would work in light fog or haze that was showing along the shore. FLIR worked extremely well in this case. The Verrazzano Bridge was hidden in fog except for the very top of the bridge towers. The FLIR showed all detail including vehicular traffic. Distance was about 4 miles. I requested the lookout on the BIG EYE scope to describe various contacts for me so I could compare visual observations to FLIR. For the most part the FLIR "saw" the same thing as the BIG EYE except that the FLIR detail wasn't as great because of the difference in magnification. One instance where there was haze the BIG EYE could not pick up both a tug and barge and could only identify the pair as a single unit. Spent most of rest of day demonstrating FLIR to various crew members.

1830 hrs. (approx 38-25 N;74-18 W) Start of first FLIR watch. Again went over the adjustments to the FLIR and also the search/scan procedure that Ens. Dietrick and I worked out. The very first lookout picked up a freighter on the horizon before the BIG EYE. This started a competition between the FLIR and BIG EYE. Worked with the first three lookouts and found them all interested and very willing to stand this extra watch.

7 March\_\_\_0600 hrs. Everyone including the CO are impressed with FLIR and feel that it will aid in their operations. Adjusted the horizontal and vertical bearing drag and improved the movement of FLIR.

2400 hrs. Weather has been steadily worsening. The ship is rolling and pitching enough to make observations very difficult. I was informed that the FLIR couldn't get a picture. I told them to secure operations for the night and I would work on it in the morning.

8 March\_\_\_0630 hrs. Did not find anything that could have caused last night's problem. Cleaned the lens and noted that there was a large amount of water spots of the sort you get when you let glasses drip dry. On later discussion it was determined that this was the possible cause. The FLIR will not work when there is a light coating of water on the lens.

1830 hrs. (approx 26-40 N;79-30 W) Continued the FLIR watch. I noted that as we traveled south, the display in the FLIR became more blurred. It appears that as the temperature of the air and water increase, the definition on the FLIR decreases. Objects that were recognized at 15 to 16 miles in colder waters were now first observed at 8 to 10 miles. As we started to approach shore we began to make more and more contacts.

9 March\_\_\_Early morning hours. A contact was made on radar that showed a possible collision course with the ship. The BIG EYE could not identify the contact. FLIR identified a sailboat as the contact and the ship adjusted course to pass safely.

0800 hrs. Arrived in Miami at Dodge Island. Capt Obrien from Group onboard. Demonstrated the FLIR and got good response to the unit.

APPENDIX B

REPORT OF FLIR AND NVS-500 OPERATION  
ON FIRST TEN DAYS OF DECISIVE CRUISE

--Abstracted form Narrative Report by Robert Barry--

--Provides additional information for the video tape recordings  
in the time period 18 May to 28 May, 1987--

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18 May----I held an indoctrination for watch-standers at 2015. Chief Bears QMC and I both covered the FLIR and its usage. The first FLIR watch was set. The sky was partially overcast, stars visible with scattered clouds. The FLIR picked up a passenger liner at 2.4 nmi. Pitch and roll both about + 1 deg.

19 May----0057 DECISIVE ran into rain squalls. Bow pitching down (0 to 2 deg), and rolling (0 to 3 deg) with a 1 1/2 deg list to port.

Lookout spotted a possible flare, and DECISIVE changed course to investigate.

--0227 FLIR picked up a small boat. I had the watch shift to 9X, NFOV (Narrow Field of View). The recorder was started at a range of 0.7 nmi. I examined the contact with the NVS-500, but the anchor light and a light on the starboard side prevented seeing details until the boat was close aboard. At around 0.4 nmi the cabin was observed to be empty. DECISIVE maneuvered to close to 30 y with the boat on our starboard side, lighting it with the starboard searchlight. This was identified visually as the TRUDY MARIE, out of Largo, FL. No one was observed on deck or in the cabin by FLIR, NVS-500, or eye.

--0450 FLIR system had shut down, cause unknown. Energized system and set the time. Upon checking the monitor, I corrected the time. Recording a contact at 2.4 nmi. At a range of 3 nmi it was 3 divisions long. The watch secured at 0510.

--1245 I held an indoctrination to the FLIR for the Quartermasters of the watch and the Boatswain mates of the watch. Inspecting the FLIR, I noticed vibration in the pedestal. Ship speed was 17 knots. The deck of the flying bridge was vibrating, apparently causing the pedestal to vibrate.

--1930 I energized the FLIR system and set time. I tested the FLIR and cleaned the lens. I brought the 2X extender (magnifier) lens up from Combat Information Center and installed it.

--2043 Radar and visual contact at 5.1 nmi.--searching with FLIR. Acquired contact at 3.8 nmi. Using 2X extender, 18X total. Hull aft of the peak tank appeared warm, with the frames clearly visible. The stack and engine compartments showed very well.

--2056 Interference--could be port winch lowering the inflatable boat.

--2101 Shifted FLIR to wide field of view (6X). Contact was identified as the M/V CLARIBEL.

--2106 End of original VCR Tape No. 1.

--ORIGINAL TAPE NO. 2--

--2123 I installed a new cassette and resumed recording.

--2135 Shifted to narrow field of view (18X). Boarding party declared Code 4. Interference for about 80 seconds, could be radio transmission. Had an additional two clicks of interference at 2139. As CLARIBEL rolled, the square after hatch was clearly visible and appeared very warm, like a chimney.

--2147 Watch stopped recording.

Coast Guard repaired fuel lines to the diesel of CLARIBEL and brought the DECISIVE alongside to rewire and recharge the batteries, securing CLARIBEL to DECISIVE'S starboard side. The Coast Guard tested the cargo, estimated at 346 bales of marijuana, about 15 to 18 tons.

20 May--after 0400 M/V CLARIBEL got underway with a prize crew aboard. DECISIVE and CLARIBEL underway for Key West, FL.

--1330 FLIR energized (without recording) to monitor PT. LOBO, an 85 ft cutter.

--1500 M/V CLARIBEL was transferred to PT. LOBO for towing. DECISIVE got underway for Key West.

--2000 I energized FLIR system.

--2009 Lost power. System reenergized and time reset. Radar Contact "A". Ship maneuvering to intercept.

--2050 Picked up contact on FLIR, NFOV with 2X extender lens. Since Quartermaster could not find FLIR log, no FLIR watch set. Good detail on FLIR. NVS-500 image masked by lights; the outriggers were the dominant feature that was clear.

--2350 I secured the FLIR system and removed the 2X extender lens (end of use).

21 May--1215 Moored at Key West, FL.

--1700 Underway.

--2000 I energized the FLIR system. After cleaning the lens, I installed the spray shield. Speed was 17 knots and relative wind about 25 knots.

--2007 Locked FLIR at 000 deg bearing and recorded pitch; then trained FLIR to 270 deg and recorded roll.

--2330 Radar contact. DECISIVE changed course to contact. Manned FLIR, but did not record. Wind was gusting to 31 knots, relative. Unable to acquire contact with FLIR.

22 May--0015 Rain squall. Contact no longer visible at under 5 nmi.

--0045 I secured the FLIR at 180 deg bearing.

--0115 Still in rain squall with the wind gusting to over 36 knots, relative.

--0200 Wind still over 30 knots. I secured the FLIR system.

--ORIGINAL TAPE NO. 3--

22 May--1325 Boarding small coaster, M/V ESJOCI. Two very hot vertical exhaust pipes aft, one port and one starboard, outboard of the access ladder. A third exhaust pipe and muffler on the port side appeared to be unused, and did not show up on the FLIR. Crew of eight gathered on the fantail. Very easy to distinguish between the crew and the boarding party. Boarding party found a false deck in the forward hold with 18 Haitians hiding under it. They had to tear up the decking to get them to come out. Too many and too close together to count with the FLIR.

--1500 Coast Guard crew pumping bilges on M/V Esjoci. Reddish discharge, clearly visible on FLIR.

--1530 Transferring 4 x 4's and tools to M/V Esjoci.

Second contact, M/V Paulina Express. Monitored through FLIR, but not recorded.

--2100 Escorting M/V Esjoci to Miami, FL. Monitoring with FLIR. M/V Esjoci is supposed to be on Decisive's port beam; however, she keeps drawing ahead and moving further south of track, toward

Cuban waters. M/V Esjoci's master requested course--may be having compass problems. Coast Guard Officer of the Deck told him to steer course 300°.

--2320 M/V Esjoci dropping astern.

--2323--Recording FLIR images; anchor cable visible. Esjoci's master claims to have run aground.

--2334 Bearing to M/V Esjoci about 315°.

--2344 Bearing shifted to about 175°. FLIR looking between the expanded metal shield and the mast.

May 23--0004 Shifted to NFOV, 9X. The expanded metal shield and halyards are visible in the foreground while monitoring Esjoci.

--0025 End of original Tape 3.

--ORIGINAL TAPE NO. 4--

--2000 Energized FLIR, cleaned lens and set time.

24 May--0100 M/V Esjoci DIW. Repairs carried out.

0346--Recording Tape 4. Contact appears to be a freighter with a barge on its port side. Bearing about 320° at start decreasing to 290°.

0349--M/V Esjoci bearing 340° drifts to 315°.

--0420 The cold muffler, outboard side aft, is clearly visible at a target angle of 350° or greater. The inboard muffler is also visible, but at target angles of 340° or greater. The starboard muffler is highly visible at target angles greater than 010°.

--0435 Original Tape 4 ended.

--1945 Energized FLIR, monitoring 41 ft Coast Guard boat approaching Decisive. Refueling 41 ft boat alongside to port. INS agent aboard. Decisive's whale-boat used to transfer personnel to M/V Esjoci. Haitians transferred to fantail of Decisive.

25 May--0100 Decisive underway for Haiti and Puerto Rico. Due to watch on the fantail, no FLIR watch was set.

--2100 Energized FLIR system, set time, cleaned lens, and tested system.



--ORIGINAL TAPE NO. 5--

26 May--0036 Recording a freighter, bearing about  $270^{\circ}$  for three minutes.

--0122 Recorded second contact on port side.

--0307 Recording a freighter at bearing  $070^{\circ}$ ; image on FLIR was very poor. I could just make out the four king posts. The stack and engine room were the only good images.

--1300 Energized FLIR system at the captain's request, set time, and trained FLIR on sailboat. Good image on FLIR, a man and a woman clearly discernible. The cockpit showed heat, and a boarding party was sent.

--1400 Boarding party back aboard. Heat was from cooking in galley. This contact was not recorded.

--2000 I energized FLIR system, set time, and trained FLIR on a second sloop. I watched the boarding party and the sailboat, but this was not recorded.

27 May--0112 Recording sailboat on tape. Bearing about  $270^{\circ}$ ; NFOV. Bearing increased to  $315^{\circ}$  in the twenty minutes that we were recording.

--0146 FLIR on a second sailboat at a bearing of about  $000^{\circ}$ , target angle  $300^{\circ}$ . Recorded for eight minutes.

--0430 FLIR secured because of ground on 115 VAC bus.

--1000 Energized FLIR system, set time, trained FLIR on a sailboat. 1.0 division NFOV at acquisition. Boarding team sent to boat. Not recorded.

--1400 Energized FLIR system. Currently no ground. Secured FLIR.

--1443 Energized FLIR system, set time, and tracked a small M/V for about eight minutes. Not recorded. Secured FLIR.

28 May--0930 Decisive moored at Roosevelt Roads.

--1200 Isolated ground to the AN/KAS-1 (sensor) power supply. I departed ship.

APPENDIX C

FLIR LOGS

PAGE

CGC VIGOROUS-----C-3

CGC DECISIVE-----C-18

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# USCGC VIGOROUS-FLIR ACTION LOG

Sequence No.	Date	Time	Longitude	Latitude	Maximum Pitch (°)	Target Bearing	Radar Range (Y)	Radar Signal Strength	Target Ht. (ft)	Target Wd. (ft)	Target Angle	Ship Type	Ship/Crew Actions	NOTES: New Vessel Found? Other Observations	Observer / Recorder
1.	6 MAR 87	1917R	74°18'	38°00'	2/2	040	16.1	STRONG			045	LARGE		RADAR VISUAL / RANGE	BOF
2.	6 MAR 87	1940R	74°18'	38°00'	2/2	350	15.0	STRONG			150	Medium		F/V	SLC
3.	6 MAR 87	2226	74°32'	37°28'	2/2	270	2500	STRONG	1/2	2	270	Small		F/V	SLC
4.	6 MAR 87	2233	74°33'	37°28'	2/2	270	2500	STRONG	1/2	1 1/2	190	Small		F/V	SLC
5.	6 MAR 87	2325	74°31'	37°12'	2/2	231	5900	STRONG	1/2	1 1/2	120	Small		F/V	SLC
6.	6 MAR 87	2333	74°31'	37°12'	2/2	231	5900	STRONG	1/2	1 1/2	120	Small		F/V	SLC
7.	6 MAR 87	0000D	74°38'	36°56'	1/1	340	10000	STRONG	3	18	240	FRIGHTER		RADAR OUTLINE OF VESSEL	PAW
8.	6 MAR 87	0010	74°38'	36°56'	1/1	340	10000	STRONG	2	15	090	FRIGHTER		"	PAW
9.	6 MAR 87	0025	74°38'	36°56'	1/2	090	4000	STRONG	2	3	090	F/V	DECK RIGGING IDENTIFIABLE	RADAR / CLEAR PICTURE GOOD OUTLINE	PAW
10.	6 MAR 87	0100	74°42'	36°43'	1/2	350	3800	STRONG	1,2	3	290	F/V	DECK RIGGING IDENTIFIABLE	RADAR	PAW
11.	6 MAR 87	0115	74°42'	36°43'	1/2	350	3800	STRONG	1,2	3	300	F/V	DECK RIGGING IDENTIFIABLE	RADAR	PAW
12.	6 MAR 87	0125	74°42'	36°41'	1/2	090	4000	STRONG	2	6	090	F/V	DECK RIGGING IDENTIFIABLE	OUTLINE OF VESSEL	PAW
13.	6 MAR 87	0135	74°44'	36°37'	1/2	000	14000	ST	1	1	180	FRIGHTER	DECK RIGGING IDENTIFIABLE	FRONT VESSEL	PAW
14.	6 MAR 87	0200	74°45'	36°30'	2/2	090	14000	ST	2,5	6	090	F/V	DECK RIGGING IDENTIFIABLE	FRONT VESSEL	PAW
15.	6 MAR 87	0217	74°45'	36°26'	2/2	090	14000	ST	1	2	11	"	DECK RIGGING IDENTIFIABLE	"	PAW
16.	6 MAR 87	0300	74°46'	36°12'	2/2	055	18000	ST	2	2	235	F/V	DECK RIGGING IDENTIFIABLE	"	PAW
17.	6 MAR 87	0328	74°46'	36°06'	2/2	060	18000	ST	2	2	275	F/V	DECK RIGGING IDENTIFIABLE	"	PAW
18.	6 MAR 87	"	74°49'	36°06'	2/2	083	10000	ST	2	2	235	F/V	DECK RIGGING IDENTIFIABLE	"	PAW

NOTE: Reticle Units x Range (yards) x 0.00164 = Size (yards).

# USCGC VIGOROUS-FLIR ACTION LOG

Date	Time	Longitude	Latitude	Minimum Pitch (deg): Roll (m) Angle	Target Bearing	Radar Range (Y)	Radar Signal Strength	Target Ht. (ft) (est.) Y (m)	Target Wd. (ft) (est.) Y (m)	Target Angle	Ship Type	Ship/Crew Actions	NOTES: How Was Target Found? Other Observations	Observer / Recorder
17 MAR 87	0330	74 41	36 06	2/2	085	10000	ST	2	2	90	F/V	Pilot House Vis. OLE	RADAR	RAF
18 MAR 87	0355	74 54	36 01	2/2	010	10000	ST	3	2	180	F/V	Pilot House Vis. OLE	RADAR	BEF
19 MAR 87	0415	74 57	35 57	2/2	000	17000	ST	1	3	270	F/V	Pilot House Vis. OLE	RADAR	BEF
20 MAR 87	0425	74 54	35 54	2/2	355	14000	ST	1	3	290	F/V	Pilot House Vis. OLE	RADAR	BEF
21 MAR 87	0440	75 00	35 50	2/2	015	25000	ST	1	3	220	FREIGHTER	Crew Fun	RADAR	BEF
22 MAR 87	0446	75 01	35 49	2/2	350	27000	ST	4	8	160	FREIGHTER	Crew Fun	RADAR	BEF
23 MAR 87	0505	75 03	35 31	2/2	010	28000	Mod	.7	.7	-	APPEAR AS DOTS		RADAR	BEF
24 MAR 87	0505	75 03	35 31	2/2	010	28000	Mod	.7	.7	-	"		RADAR	BEF
25 MAR 87	0534	75 06	35 31	2/2	010	28000	Mod	.7	.7	-	"		RADAR	BEF
26 MAR 87	0535	75 05	35 30	2/2	025	26000	ST	2	4	090	FREIGHTER	Simulator Head	RADAR	BEF
27 MAR 87	0600	75 05	35 26	2/2	030	26000	ST	8	8	240	FREIGHTER	Simulator Head	RADAR	BEF
28 MAR 87	0630	75 10	35 12	2/2	030	28000	ST	2	2	180	FREIGHTER	Simulator Head	RADAR	BEF
29 MAR 87	0630	75 10	35 12	2/2	030	28000	ST	2	2	030	CONTAINER	Visual by FLIR unit FIRST	Visual by FLIR unit FIRST	SK
27 MAR 87	2215	79 49	77 12	2/2	012	19,000	ST	2.5	5	095	F/V			SK
28 MAR 87	2230	79 50	77 09	2/2	010	19,000	ST	3	4	100	FREIGHTER			SK
29 MAR 87	2320	79 54	77 02	1/1	355	8,000	ST	3	5	100	FREIGHTER			SK
30 MAR 87	0100	79 57	76 57	1/1	030	7,000	ST	3	5	100	FREIGHTER			SK
31 MAR 87	0103	79 57	76 57	1/1	287	10,000	ST	0.5	3.5	690	FREIGHTER		Radar	SK

NOTE: Reticle Units x Range (yards) x 0.00184 = Size (yards).

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# USCGC VIGOROUS-FLIR ACTION LOG

Date	Time	Longitude	Latitude	Mach (kt)	Target Bearing	Range (ft)	Radar Signal Strength	Target Ht. (ft)	Target Wd. (ft)	Target Angle	Ship Type	Ship/Crew Actions	NOTES: How Was Target Found? Other Observations	Observer Recorder
30 MAR 87	0122	74°57'26.47"	26°47'	1/1	028°	3000	ST	0.5	1.5	310	S/V		RADAR	SK
31 MAR 87	0152	79°57'	26°47'	1/1	350°	12000	ST	1	2	180°	FRGT.		Radar	SK
32 MAR 87	0224	79°57'	26°32'	0/0	170°	13000	ST	2	3	170°	FRGT.	Observed	RADAR	SK
33 MAR 87	0238	79°57'	26°30'	0/0	170°	13000	ST	2	2	170°	FRGT.	Observed	CRANE/LHS	SK
34 MAR 87	0245	79°57'	26°30'	0/0	304°	4000	ST	1	2	280°	CRANE	Observed	CRANE/LHS	SK
35 MAR 87	0249	79°57'	26°25'	0/0	304°	4000	ST	1	3	265°	CRANE	Observed	CRANE/LHS	SK
36 MAR 87	0305	79°57'	26°25'	0/0	328°	8000	ST	2	4	110°	Tanker	Observed	CRANE/LHS	SK
37 MAR 87	0316	79°57'	26°20'	0/0	294°	6000	ST	3	9	295°	Tanker	Observed	CRANE/LHS	SK
38 MAR 87	0341	79°55'	26°13'	0/0	300°	300	ST	1/2	1	030°	Submarine	Observed	CRANE/LHS	SK
39 MAR 87	0345	79°53'	26°11'	0/0	300°	300	ST	1/2	1	030°	Submarine	Observed	CRANE/LHS	SK
40 MAR 87	0345	79°53'	26°11'	0/0	300°	300	ST	1/2	1	030°	Submarine	Observed	CRANE/LHS	SK
41 MAR 87	0345	79°53'	26°11'	0/0	300°	300	ST	1/2	1	030°	Submarine	Observed	CRANE/LHS	SK
42 MAR 87	0345	79°53'	26°11'	0/0	300°	300	ST	1/2	1	030°	Submarine	Observed	CRANE/LHS	SK
43 MAR 87	0345	79°53'	26°11'	0/0	300°	300	ST	1/2	1	030°	Submarine	Observed	CRANE/LHS	SK
44 MAR 87	0345	79°53'	26°11'	0/0	300°	300	ST	1/2	1	030°	Submarine	Observed	CRANE/LHS	SK
45 MAR 87	0345	79°53'	26°11'	0/0	300°	300	ST	1/2	1	030°	Submarine	Observed	CRANE/LHS	SK

NOTE: Reticule Units x Range (yards) x 0.00164 = Size (yards).

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# USCGC VIGOROUS-FLIR ACTION LOG

USCGC VIGOROUS-FLIR ACTION LOG														
Date	Time	Longitude	Latitude	Maximum Pitch (deg)	Target Bearing	Radar Range (y)	Radar Signal Strength	Target Ht. (ft)	Target Wtd. (sq ft)	Target Angle (deg)	Ship Type	Ship/Crew Actions	NOTES: How Was Target Found? Other Observations	Observer / Recorder
12 MAR 87	0805			2/3	350	10000	ST	1.5	4.5	330	CRUISER	5000 STRUTTER	REMARK / VIS / CELL / GUN	
12 MAR 87	0815				300	10000	ST	2.75	10	110	T/B	WATER CANNON, S.S.	RADAR / VIS / 400 YDS	
12 MAR 87	0825				348	20000	ST	1.5	6.5	300	TANKER	5000 STRUTTER	VISUAL 213 YDS	
12 MAR 87	0832				045	17000	ST	2.0	5.75	950	CRUISER SHIP	SUPER STRUCTURE EXHAUST, BULDOSE	RADAR / VIS 100 YDS	
12 MAR 87	0837			0/0	314	36000	ST	.5	3	280	CRUISER	TARGET, SHULL	RADAR / VIS	
12 MAR 87	0841			0/0	316	40000	ST	2.5	1	350	CRUISER	SHULL, SHULL	CRUISER / VIS	
12 MAR 87	0844			0/0	016	13000	ST	3	5	070	CRUISER	SHULL, SUPERSTRUCTURE	CRUISER / VIS	
12 MAR 87	0847			0/0	016	13000	ST	6	20	090	CRUISER	SHULL, SUPERSTRUCTURE	CRUISER / VIS	
12 MAR 87	0850			0/0	016	13000	ST	3	12	280	CRUISER	SUPERSTRUCTURE	CRUISER / VIS	
12 MAR 87	0853			0/0	016	13000	ST	1	3	100	CRUISER	SHULL, SHULL	CRUISER / VIS	
12 MAR 87	0855			0/0	310	8000	ST	4.18	4.0	270	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	0858			0/0	280	6000	ST	4	12	270	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	0859			0/0	354	11500	ST	1.12	3.3	270	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	0905			0/0	220	12000	ST	0.5	6	220	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	0910			0/2	275	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	0915			0/0	010	12000	ST	0.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	0925			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	0935			0/0	010	12000	ST	0.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	0940			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	0945			0/0	010	12000	ST	0.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	0950			0/0	010	12000	ST	0.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	0955			0/0	010	12000	ST	0.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1000			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1005			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1010			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1015			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1020			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1025			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1030			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1035			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1040			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1045			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1050			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1055			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1100			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1105			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1110			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1115			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1120			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1125			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1130			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1135			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1140			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1145			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1150			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1155			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1200			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1205			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1210			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1215			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1220			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1225			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1230			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1235			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1240			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1245			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1250			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1255			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1300			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1305			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1310			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1315			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1320			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1325			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1330			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1335			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1340			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1345			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1350			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1355			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1400			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1405			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1410			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1415			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1420			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1425			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1430			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1435			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1440			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1445			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1450			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1455			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1500			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1505			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1510			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1515			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1520			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1525			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1530			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1535			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1540			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1545			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1550			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1555			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1600			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1605			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1610			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1615			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1620			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1625			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1630			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1635			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1640			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87	1645			0/2	012	10000	ST	.5	3.5	080	CRUISER	SHULL, SHULL	RADAR / VIS	
12 MAR 87														

**NOTE: Reticle Units x Range (yards) X 0.00164 = Size (yards).**

**BAUC Chemicals Barcode 07101 (3/8)**

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USCGC VIGOROUS-FLIR ACTION LOG														
Date	Time	Longitude	Latitude	Maximum Pitch (est.)	Target Bearing	Radar Beam (°)	Radar Signal Strength	Target Ht. (est. units)	Target Wd. (est. units)	Target Angle	Ship Type	Ship/Crew Actions	NOTES: How Was Target Found? Other Observations	Observer / Recorder
15 May	1405	73 43 W	20 04 N	1.2	290°	4 200	STRONG	1/2	4	120°	Freighter	N/A	RADAR 42-3397	
15 May	1428	73 52	19 32	3°	290	6000	Strong	2	10	260°	Freighter	N/A	COAST 1100 325 12 415	
16 MAR	0215	72 53	18 57	0/0	025	4000	ST	1	1	080	SV	N/A	SIN NO LIGHTS	
16 MAR	0226	72 52	18 56	0/0	350	4000	STR	1	2	350	Freighter	N/A	RAAR (P) (P)	
16 MAR	0230	72 52	18 56	0/0	040	4000	STR	1	1	090	SV	N/A	SIN NO LIGHTS	
16 MAR	0430	72 50	18 45	0/0	320	3000	STR	1.5	2	220	SV	N/A	SIN NO LIGHTS	
16 MAR	0540			Note to	Pub Lights:		Report	Range in Yards						
16 MAR	0540	73 51	19 10	0/0	040	1000	STR	1.5	2	080	SV	N/A	SIN NO LIGHTS	
16 MAR	1600	73 29	19 18	2/1	350	1400	STR	-	11	080	Freighter	N/A	US: 5-band freighter	
16 MAR	1800	73 58	20 00	2/1	270	6000	STR	3	10	090	Freighter	N/A	RAAR/US	
16 MAR	2307	73 58	20 00	2/1	270	6000	STR	3	10	280	Freighter	N/A	COAST/US	
17 MAR	0140	73 49	20 01	2/1	270	5000	STR	5	14	270	Freighter	N/A	US: no ship RAAR/US	
17 MAR	0430	73 15	20 20	3/5	100°	12 200	Med	-	-	090	Freighter	N/A	RAAR/US: Not found after	
17 MAR	0445	73 16	20 20	4/5	270	5000	STR	-	-	270	Freighter	N/A	RAAR/US: Not found after	
17 MAR	0450	73 17	20 20	3/5	260	2 250	STR	2	7 (26)	250	Freighter	N/A	RAAR/US: Not found after	
17 MAR	0500	73 17	20 20	2/8	270	5000	STR	2	4	270	Freighter	N/A	RAAR/US: Not found after	
17 MAR	0520	"	"	2/8	040	3 800	STR	3	6	220	Freighter	N/A	RAAR/US: Not found after	
17 MAR	0705	73 17	20 20	2/8	270	5000	STR	3	6	270	Freighter	N/A	RAAR/US: Not found after	
20 MAR	1042	73 51.2	20 50.2	0/0	040	400		3 1/2	10	210	Freighter	N/A	RAAR/US: Not found after	

**NOTE: Reticle Units x Range (yards) x 0.00164 = Size (yards).**

**BANC: Quantica Barcode 07101 1307**

## USCGC VIGOROUS-FLIR ACTION LOG

[illegible]

**NOTE: Reticle Units x Range (yards) X 0.00164 = Size (yards).**

**PAUC Gravellos Plutopho 07101 (30);**

Date	Time	Longitude	Latitude	Maximum Pitch (°)	Target Bearing	Radar Range (y)	Radar Signal Strength	Target Ht. (ft)	Target Wd. (ft)	Target Angle	Ship Type	Ship/Crew Actions	NOTES: How Was Target Found? Other Observations	Observer / Recorder
3/23/87	23:35	20°15'	73°42'	0-0	355°	6,100	SPRM	3	10	095	Tanker	Hull	WAS PR	Observer: [Signature] Recorder: [Signature]
3/23/87	05:10	20°41'	73°56'	1/1	025°	8,000	SPRM	1.5	2	200	Submarine	Breaker port close bow.	RAOAR	Observer: [Signature] Recorder: [Signature]
3/23/87	23:51	19°50'	74°11'	1/1	214°	8,000	SPRM	1.5	2	270	Submarine	Outline of superstructure not clear	RAOAR	Observer: [Signature] Recorder: [Signature]
3/23/87	18:30	20°41'	73°42'	1/1	025°	8,000	SPRM	1.5	2	270	Submarine	Outline of superstructure not clear	RAOAR	Observer: [Signature] Recorder: [Signature]
3/23/87	19:15	20°41'	73°42'	1/1	025°	8,000	SPRM	1.5	2	270	Submarine	Outline of superstructure not clear	RAOAR	Observer: [Signature] Recorder: [Signature]
3/23/87	22:06	20°41'	73°42'	1/1	025°	8,000	SPRM	1.5	2	270	Submarine	Outline of superstructure not clear	RAOAR	Observer: [Signature] Recorder: [Signature]
3/24/87	01:11	21-02	73-42	2/0	055°	6,100	SPRM	2	5	095	Tanker	Hull	WAS PR	Observer: [Signature] Recorder: [Signature]
3/24/87	07:10	21-08	73-49	2/0	090°	6,100	SPRM	2	5	095	Tanker	Hull	WAS PR	Observer: [Signature] Recorder: [Signature]
3/26/87	03:12	21-29N	74-04	1/2	339°	12,000	SPRM	13 NM	13 NM	180°	Submarine	Breaker port close bow.	RAOAR	Observer: [Signature] Recorder: [Signature]
3/26/87	04:20	20-20N	73-50N	1/2	270°	12,000	SPRM	13 NM	13 NM	180°	Submarine	Breaker port close bow.	RAOAR	Observer: [Signature] Recorder: [Signature]
3/26	20:12	20-20N	73-50N	1/2	270°	12,000	SPRM	13 NM	13 NM	180°	Submarine	Breaker port close bow.	RAOAR	Observer: [Signature] Recorder: [Signature]
3/26	20:16	20-20N	73-50N	1/2	270°	12,000	SPRM	13 NM	13 NM	180°	Submarine	Breaker port close bow.	RAOAR	Observer: [Signature] Recorder: [Signature]
3/26	20:47	20-20N	73-50N	1/2	270°	12,000	SPRM	13 NM	13 NM	180°	Submarine	Breaker port close bow.	RAOAR	Observer: [Signature] Recorder: [Signature]
3/26	20:49	20-20N	73-50N	1/2	270°	12,000	SPRM	13 NM	13 NM	180°	Submarine	Breaker port close bow.	RAOAR	Observer: [Signature] Recorder: [Signature]
3/26	22:45	20-20N	73-50N	1/2	270°	12,000	SPRM	13 NM	13 NM	180°	Submarine	Breaker port close bow.	RAOAR	Observer: [Signature] Recorder: [Signature]
3/26	20:47	20-20N	73-50N	1/2	270°	12,000	SPRM	13 NM	13 NM	180°	Submarine	Breaker port close bow.	RAOAR	Observer: [Signature] Recorder: [Signature]

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# USCGC VIGOROUS-FLIR ACTION LOG

Date	Time	Longitude	Latitude	Maximum Pitch (in)	Target Bearing	Radar Range (Y)	Radar Signal Strength	Target Ht. (ft)	Target Wt. (lb)	Target Angle	Ship Type	Ship/Crew Actions	NOTES: How Was Target Found? Other Observations	Observer / Recorder
3/26	2315	2044N	7350W	3/1	270	11,000	Strong	—	—	270	CRUISE LINER	NONE, v/w	only thing visible is smoke	WLT
3/27	0045			3/1	090	6,000	STRONG	1	3.5	090	"	NONE y/w	only thing visible is smoke	WLT
3/27	0100			3/1	000	6,000	STRONG	5	1.7	040	"	NONE y/w	ONLY THING VISIBLE	WLT
3/27	0110			3/1	015	4,000	STRONG	42	6	190	"	NONE y/w	ONLY THING VISIBLE	WLT
3/27	0230			3/1	020	10,000	STRONG	3	12	100	FREIGHTER	NONE y/w	FAINT HULL & SUPERST	WLT
3/27	0240			3/1	045	4,000	STRONG	3	14	150	FREIGHTER	NONE y/w	"	WLT
3/27	0340			3/1	000	6,000	STRONG	3	10	200	"	NONE y/w	"	WLT
3/27	0345			3/1	035	4,000	STRONG	5	18	230	"	"	"	WLT
3/27	0347			3/1	270	3,400	STRONG	5	24	270	CRUISE LINER	NONE y/w	only thing prominent	WLT
3/27	0400	2153	7400	5/5	190	10,000	STRONG	—	—	285	CRUISE LINER	NONE y/w	only thing prominent	WLT
3-29	0200			1/2	050	12,000	STR	—	—	—	CRUISE LINER	NONE y/w	only thing prominent	WLT
3-29	1921	2059N	7450W	2/0	004	4,000	STR	1	4.2	040	CRUISE LINER	NONE y/w	only thing prominent	WLT
"	1928	2059N	7450W	1/1	270	6,000	STR	1	4.8	090	"	NONE y/w	only thing prominent	WLT
3/29	1947			2/1	270	6,000	STR	1	2.5	270	CRGT.	unclear	only thing prominent	WLT
3/29	1956			2/1	270	10,000	STR	4	1.1	260	"	unclear	only thing prominent	WLT
3/29	2004			2/1	345	8,000	STR	1	2	000	CRUISE LINER	unclear	only thing prominent	WLT
3/29	2010	2053N	7445W	2/1	005	10,000	STR	2	?	140	CRUISE LINER	unclear	only thing prominent	WLT
3/29	2120	2052N	7430W	1/1	000	6,500	STR	1.5	?	?	?	unclear	only thing prominent	WLT
3/29	2150			2/1	270	20,500	STR	1	3.5	190	FRGT.	unclear	only thing prominent	WLT

NOTE: Reticle Units x Range (yards) x 0.00164 = Size (yards).

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USCGC VIGOROUS-FLIR ACTION LOG															
Date	Time	Lat	Long	Co-ord Latitude	Maximu pitch (x) Roll (x)	Target Bearing	Radar Range (Y)	Radar Signal Strength	Target Ht. rel. units (x or y) (ft or m)	Target Wdth rel. units (x or y) (ft or m)	Target Angle	Ship Type	Ship/Crew Actions	NOTES: How Was Target Found? Other Observations	Observer / Recorder
3/27	2332	2044	7432	0/0		240	4000	ST	2	13	175	ESCAPE	U/W	Reduced	SKS
3/30	0000	2009	7402	3/1		090	2000	ST	3	16	085	ESCAPE	FLIR D.O	USUALLY	BEF
3/30	0119	2016	7352	1/1		090	8000	ST	3	2	270	ESCAPE	FLIR D.O	Net Pick UP	
3/30	0215	2002	7352			090	8000	ST	3	1	180	ESCAPE	FLIR D.O	USUALLY	
3/31	0500	2039	7358	1/3		350	15000	ST	-	-	-	ESCAPE	FLIR D.O	USUALLY	JA
3/31	0500	2039	7358	1/3		020	12000	ST	-	-	-	ESCAPE	FLIR D.O	USUALLY	JA
3/31	0515	2042	7358	1/3		090	6000	ST	2	14	090	ESCAPE	FLIR D.O	USUALLY	JA
3/31	1910	2336	7437	1/0		280	6000	ST	2.5	6	250	ESCAPE	FLIR D.O	USUALLY	JA
3/31	1953			1/0		095	9000	ST	1.5	2	320	ESCAPE	FLIR D.O	USUALLY	JA
4/1	1850			3/1		270	16000	ST	1	2	300	ESCAPE	FLIR D.O	USUALLY	JA
4/1	1909			2/1		305	29000	ST	1	1.5	270	ESCAPE	FLIR D.O	USUALLY	JA
4/2	1845			5/5		310	17500	ST	1	6	080	ESCAPE	FLIR D.O	USUALLY	JA
4/2	1905			5/5		285	15600	ST	2	8	240	ESCAPE	FLIR D.O	USUALLY	JA
4/2	1956	3452.3	7502.3	0/10		340	12000	ST	2	6	160	ESCAPE	FLIR D.O	USUALLY	JA
"	2016	3455.5	7510.5	0/10		250	17000	ST	1.2	4	050	ESCAPE	FLIR D.O	USUALLY	JA
"	2100	3504.9	7502.9	0/10		240	16000	ST	1.2	6	090	ESCAPE	FLIR D.O	USUALLY	JA
4/2	2124	3514.1	7512.1	0/10		270	5400	ST	1.8	8	270	ESCAPE	FLIR D.O	USUALLY	JA
"	2145	3512.1	7512.1	0/6		000	19000	ST	1	1	180	ESCAPE	FLIR D.O	USUALLY	JA
"	2201	3523.1	7516.1	0/6		285	9000	ST	2.5	8	285	ESCAPE	FLIR D.O	USUALLY	JA

NOTE: Reticle Units x Range (yards) x 0.00164 = Size (yards).

REDC Graphics Replage 87181 D46

USCGC VIGOROUS-FLIR ACTION LOG											
Date	Time	Longitude	Latitude	Maximum Pitch (m)	Target Bearing	Radar Range (y)	Radar Signal Strength	Target Ht. (ft)	Target Wd. (ft)	Target Angle	Ship Type
4/2	0445	35 32.1	73 29.1	0/6	342	2400	ST	3	4	285	FW
4/2	0450	35 34.1	73 29.1	0/5	140	2400	ST	3	16	150	FREIGHTER
4/2	0455			0/5	330	8000	ST	3	6	330	"
4/2	0500			0/5	270	9310	ST	3	26	300	"
4/2	0505			0/5	050	4800	ST	3	4	270	"
4/2	0510			0/5	050	13400	ST	3	10	160	"
4/2	0515			0/5	110	12000	ST	3	3	110	"
4/2	0520			0/5	000	10000	ST	3	8	010	FREIGHTER
4/2	0525			0/5	030	8130	ST	3	22	030	"
4/2	0530			0/5	150	3200	ST	3	7	150	"
4/2	0535			0/5	320-270	1700	ST	1	7	280	LAND
4/2	0540			0/5	349	10100	ST	2	10	270	FREIGHTER
4/2	0545			0/5	375	161	ST	2	10	270	"
4/2	0550			0/5	080		ST	2	10	270	"
4/2	0555			0/5	149	149	ST	.5	.25	010	"
4/2	0600			0/5	160	9.0	ST	.5	2	060	"
4/2	0605			0/5	170	7.0	ST	1	3	070	"
4/2	0610			0/5	195	4.72	ST	2	13	270	"
4/2	0615			0/5	055	5.0	ST	—	—	—	"

NOTE: Reticle Units x Range (yards) x 0.00164 = Size (yards).

FLIRC Graphics Page 8/181 (2/87)

# USCGC VIGOROUS-FLIR ACTION LOG

Date	Time	Lat Longitude	Long Latitude	Maximum Pitch (in) Roll (in) Angle	Target Bearing	Radial Range (y)	Radial Signal Strength	Target Ht. ft. (est) (ft) : Y (ft)	Target Wd. ft. (est) (ft) : Y (ft)	Target Angle	Ship Type	Ship/Crew Actions	NOTES: How Was Target Found? Other Observations	Observer : Recorder
4-5	0410	38-51	73-57	1/2	050	6,000	STR	2	4	270	TANKER	COMPLETE AND VESSELS WERE PICKING UP IN THE BOA OF THE VESSELS.	GOOD OUTLINE OF VESSEL - NO PICKING UP IN THE BOA OF THE VESSELS.	WGP
4/5/87	1900													
4/5/87	1917													
4/6/87	1945	41-01	70-00	0/0	044	800	STR	8	14	200	TANKER	SEENED FLIR BECAUSE OF WATER 3 mi off shore - Can see water & steam light only by eye - Good outline of FLIR.	Observer: Recorder	
4/6/87	2015	41-05	70-50	1/0	030	1500	STR	5	14	190	TANKER	2nd DIS IN FLIR - CAN SEE STEAM LIGHT ONLY	Observer: Recorder	
4/6/87	2045	40-50	70-50	1/0	040	1000	STR	3	2.5	180	TANKER	BY EYE & BIG EYES - GOOD IMAGES WITH FLIR.	Observer: Recorder	
4/6/87	2105	40-56	70-40	1/0	260	8,000	STR	BLIP	BLIP	?	TANKER	2nd DIS IN FLIR - CAN SEE STEAM LIGHT ONLY	Observer: Recorder	
4/6/87	2105	"	"	1/0	260	8,000	STR	2	7	110	TANKER	2nd DIS IN FLIR - CAN SEE STEAM LIGHT ONLY	Observer: Recorder	
4/6/87	2125	40-52	70-45	1/0	260	6,400	STR	1.5	5	100	TANKER	2nd DIS IN FLIR - CAN SEE STEAM LIGHT ONLY	Observer: Recorder	
4/6/87	2125	"	"	1/0	260	6,400	STR	1.5	5	?	TANKER	2nd DIS IN FLIR - CAN SEE STEAM LIGHT ONLY	Observer: Recorder	
4/6/87	2145	40-44	70-40	1/0	270	10,000	STR	1	3	090	TANKER	2nd DIS IN FLIR - CAN SEE STEAM LIGHT ONLY	Observer: Recorder	
4/6/87	2145	"	"	1/0	270	10,000	STR	1	3	?	TANKER	2nd DIS IN FLIR - CAN SEE STEAM LIGHT ONLY	Observer: Recorder	
4/6/87	2145	"	"	1/0	270	10,000	STR	1	3	?	TANKER	2nd DIS IN FLIR - CAN SEE STEAM LIGHT ONLY	Observer: Recorder	
4/6/87	2240	40-43	70-20	1/0	020	10,000	STR	2	4	260	TANKER	2nd DIS IN FLIR - CAN SEE STEAM LIGHT ONLY	Observer: Recorder	
4/6/87	2245	40-39	70-24	1/0	050	3,700	STR	2	4	090	TANKER	2nd DIS IN FLIR - CAN SEE STEAM LIGHT ONLY	Observer: Recorder	
4/6/87	2245	"	"	1/0	010	22,000	STR	2	5	120	TANKER	2nd DIS IN FLIR - CAN SEE STEAM LIGHT ONLY	Observer: Recorder	
4/6/87	2300	40-37	70-22	1/0	030	12,000	STR	4	10	?	TANKER	2nd DIS IN FLIR - CAN SEE STEAM LIGHT ONLY	Observer: Recorder	
4/6/87	2310	40-57	70-20	1/0	100	10,000	STR	.5	1	?	TANKER	2nd DIS IN FLIR - CAN SEE STEAM LIGHT ONLY	Observer: Recorder	
4-6-87	2340	40-40	70-08	1/0	090	12,000	STR	.5	1	100	TANKER	2nd DIS IN FLIR - CAN SEE STEAM LIGHT ONLY	Observer: Recorder	

NOTE: Reticule Units x Range (yards) x 0.00164 = Size (yards).

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USCGC VIGOROUS-FLIR ACTION LOG														
Date	Time	Longitude	Latitude	Maximum Pitch (°): Roll (°): Angle	Target Bearing	Radar Range (y)	Radar Signal Strength	Target Ht. rel. units (max): : y (est)	Target Wd. rel. units (max): : y (est)	Target Angle	Ship Type	Ship/Crew Actions	NOTES: How Was Target Found? Other Observations	Observer / Recorder
4-9-87	2214	66.57	41.51	0/0	300	4,850	STR	.3	.5	180	F/U	STEVEN TRAWL	(CLEAR IMAGE)	MP
4-9-87	2214	"	"	0/0	343	5100	STR	.3	.5	200	F/U	STEVEN TRAWL	"	MP
4-9-87	2214	"	"	0/0	344	5830	STR	.3	.5	310	F/U	STEVEN TRAWL	"	MP
4-9-87	2229	66.58	41.53	0/0	067	9,070	STR	.5	1.5	270	CANADIAN RESERCH VESSEL			MP
4-9-87	2251	67.00	41.55	0/0	337	3,450	STR	.5	1.5	170	F/U	STEVEN TRAWL	CUSTOM IMAGE	MP
4-9-87	2251	67.00	41.55	0/0	320	3,900	STR	.5	1.5	200	F/U	STEVEN TRAWL	CUSTOM IMAGE	MP
4-10-87	0330	67.18.5	41.51.6	0/0	340	11M							3 Small Dots (white) on the horizon	MP
4/10/87	0350	67.57	41.48	0/0	310	8,400	STR	1	3	260	F/U	manila?	Clear, no signal	MP
4/10/87	0350	67.57	41.48	0/0	060	14,400	STR	BLIP	BLIP	?	F/U	1-U?	Clear, no signal	MP
4/10/87	0405	68.00	41.47	0/0	320	8,000	STR	1	3	300	F/U	manila?	Clear, no signal	MP
4/10/87	0445	68.09	41.44	0/0	080	6800	STR	.5	1	300	F/U	A-frame	Clear, no signal	MP
4/10/87	0505	68.14	41.42	0/0	120	4,400	STR	1	2	280	F/U	?	Clear, no signal	MP
4/10/87	0545	68.25	41.35	0/0	340	8000	STR	1	2	280	F/U	A-frame?	Clear, no signal	MP
4/10/87	0600	68.25	41.35	0/0	000	8000	STR	4	4	280	F/U	STEVEN TRAWL	Clear, no signal	MP
4/10/87	0607	68.25	41.35	0/0	338	330	STR	2	2.5	?	F/U	TRAWLER	Clear, no signal	MP
4/10/87	0608	68.25	41.35	0/0	300	10,000	STR	2	2	180	F/U	STEVEN TRAWL	Clear, no signal	MP
4/10/87	0635	68.25	41.35	0/0	000	10,000	STR	2	1.5	000	F/U	STEVEN TRAWL	Clear, no signal	MP
4/10/87	0638	68.25	41.35	0/0	338	10,000	STR	1.5	3	270	F/U	STEVEN TRAWL	Clear, no signal	MP
4/10/87	0643	68.25	41.35	0/0	315	10,300	STR	2	4.5	010	F/U	STEVEN TRAWL	Clear, no signal	MP

NOTE: Reticle Units x Range (yards) X 0.00164 = Size (yards).

FLIR Graphics Page 87181 (36)

Date	Time	Longitude	Latitude	Maximum Pitch (°): Roll (°) Angle	Target Bearing	Radar Range (y)	Radar Signal Strength	Target Ht. (ft. (est.))	Target Wd. (ft. (est.))	Target Angle	Ship Type	Ship/Crew Actions	NOTES: How Was Target Found? Other Observations	Observer: Recorder
4/10/87	00:07	4217	6446	0/0	330	1200	STR	.5	1.25	120°	FISH?	UNK	RADAR 1000 yds / 1000 ft	Good Fly
4/10/87	00:35	4220	6442	0/0	020	1200	ST	1	2.5	110°	FV	UNK	RADAR 1000 yds / 1000 ft	Good Fly
4/11/87	03:50	4227	7007	0/0	320	1200	ST	1	1.5	270	FV	UNK	RADAR 1000 yds / 1000 ft	Good Fly
4/10/87	04:07	4230	7009	0/0	235	1200	ST	3	6	250	FV	UNK	RADAR 1000 yds / 1000 ft	Good Fly
4/11/87	05:16	4226	7024	0/0	350	1200	ST	.5	2	290	FV	UNK	RADAR 1000 yds / 1000 ft	Good Fly
4/12	05:40			0/0	100	1200	STR	N/A	N/A	NON	FIXED	UNK	RADAR 1000 yds / 1000 ft	Good Fly
4/12	20:15			0/0	240	1200	ST	3	6	090	FV	UNK	RADAR 1000 yds / 1000 ft	Good Fly
4/12	20:15			0/0	230	1200	ST	3	8	270	FV	UNK	RADAR 1000 yds / 1000 ft	Good Fly
4/12	20:15			0/0	100	1200	ST	.7	0.1	270	FV	UNK	RADAR 1000 yds / 1000 ft	Good Fly
4/12	21:00			0/0	160	1200	ST	2.7	2.8	210	FV	UNK	RADAR 1000 yds / 1000 ft	Good Fly
4/12	21:15			0/0	154	1200	ST	2	6	260	FV	UNK	RADAR 1000 yds / 1000 ft	Good Fly
4/12	21:20			0/0	010	1200	MED	2	.2	180	UNK	UNK	RADAR 1000 yds / 1000 ft	Good Fly
4/12	21:40			0/0	230	1200	MED	10	.2	UNK	UNK	UNK	RADAR 1000 yds / 1000 ft	Good Fly
4/12	21:55			2/2	340	1200	MED	.2	.2	UNK	UNK	UNK	RADAR 1000 yds / 1000 ft	Good Fly
4/12	22:05			2/2	260	1200	ST	2	4	270	FV	UNK	RADAR 1000 yds / 1000 ft	Good Fly
4/14	19:55	4119	6843	5/10	350	2000	ST	8	28	270	GREATER	STEAMING	RADAR 1000 yds / 1000 ft	Good Fly
4/14	20:00			5/10	350	2000	ST	8	28	270	GREATER	STEAMING	RADAR 1000 yds / 1000 ft	Good Fly
4/14	20:05			5/10	350	2000	ST	8	28	270	GREATER	STEAMING	RADAR 1000 yds / 1000 ft	Good Fly
4/14	20:10			5/10	350	2000	ST	8	28	270	GREATER	STEAMING	RADAR 1000 yds / 1000 ft	Good Fly
4/14	20:15			5/10	350	2000	ST	8	28	270	GREATER	STEAMING	RADAR 1000 yds / 1000 ft	Good Fly
4/14	20:20			5/10	350	2000	ST	8	28	270	GREATER	STEAMING	RADAR 1000 yds / 1000 ft	Good Fly
4/14	20:25			5/10	350	2000	ST	8	28	270	GREATER	STEAMING	RADAR 1000 yds / 1000 ft	Good Fly
4/14	20:30			5/10	350	2000	ST	8	28	270	GREATER	STEAMING	RADAR 1000 yds / 1000 ft	Good Fly
4/14	20:35			5/10	350	2000	ST	8	28	270	GREATER	STEAMING	RADAR 1000 yds / 1000 ft	Good Fly
4/14	20:40			5/10	350	2000	ST	8	28	270	GREATER	STEAMING	RADAR 1000 yds / 1000 ft	Good Fly
4/14	20:45			5/10	350	2000	ST	8	28	270	GREATER	STEAMING	RADAR 1000 yds / 1000 ft	Good Fly
4/14	20:50			5/10	350	2000	ST	8	28	270	GREATER	STEAMING	RADAR 1000 yds / 1000 ft	Good Fly
4/14	20:55			5/10	350	2000	ST	8	28	270	GREATER	STEAMING	RADAR 1000 yds / 1000 ft	Good Fly
4/14	21:00			5/10	350	2000	ST	8	28	270	GREATER	STEAMING	RADAR 1000 yds / 1000 ft	Good Fly
4/14	21:05			5/10	350	2000	ST	8	28	270	GREATER	STEAMING	RADAR 1000 yds / 1000 ft	Good Fly
4/14	21:10			5/10	350	200								

BANC Graphica Banknote 07181 (3/8)

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USCGC VIGOROUS-FLIR ACTION LOG

Date	Time	Longitude	Latitude	Maximum Pitch (m) / Roll (m) Angle	Target Bearing	Radar Range (y)	Radar Signal Strength	Target Ht. (ft. / m) (est. max)	Target Wd. (ft. / m) (est. max)	Target Angle	Ship Type	Ship/Crew Actions	NOTES: How Was Target Found? Other Observations	Observer / Recorder
12 Feb	with GND RESURS.													
18 APR 2010	0356	74 40	1/1	270	5.2	5				UNK	UNK	UNCLEAR	Radar	SK

NOTE: Reticule Units x Range (yards) X 0.00164 = Size (yards).

RLDC Graphics Page 8/181 (06)

# USCGC DECISIVE-FLIR ACTION LOG

Date	Contact No.	Time	Latitude	Longitude	Maximum Pitch (°): Roll (°): Angle	Target Bearing	Radar Range (yd)	Radar Signal Strength	Target Ht. (ft) (est. units (100:1))	Target Wd. (ft) (est. units (100:1))	Target Angle	Ship Type	Ship Details Seen / Crew Actions	NOTES: How Was Target Found? Other Observations	Observer / Recorder
19 MAY	1	2045	26°01'	85°54'	1° X 2°	015°R	3600	MEDIUM	1.5	4	300°	Profile	SAKE.	2025R INITIAL	BARRY
20 MAY	2	0223	25°53'	83°49'	3° X 2°	180°R	6720	STRONG			000°	USCG 82'		2025R INITIAL DETAILS ON TAPE RADAR	BEANS
20 MAY	3	2047	22°08'N	077°18'W	3° X 2°	045°R	6000	MEDIUM			030°	HYDROFOIL		IMAGE WAS FAINT SIL HOLETE, UNDEFINED. RADAR 2047Q	BEANS
21 JUN	4	2120												ONLY VSL LIGHTS VISIBLE; AT APPROX 3NM	
21 JUN	5													IDENTIFIED AS USS HERCULES	Kline
21 JUN	6													ON WHT PATCH, MORE DETAILS	Kline
21 JUN	7													1.2 NM (SHIPS BINOCULARS)	Kline
21 JUN	8													SEAM/INFL DIEJA RADAR CONTACT,	Kline
21 JUN	9													FEW DETAILS	Kline
21 JUN	10													WX CLEAR, SEAS TO	Kline
21 JUN	11													VERY CLEAR AS WELL AS CREW ON DECK	Kline
21 JUN	12													NOV 5/5	Kline
21 JUN	13													TARGET APPROX 0.1 NM	Kline
21 JUN	14													DEFINITION AT 0.1 NM. ABOUT	Kline
21 JUN	15													TGT ACQUIRED	Kline
21 JUN	16													OR SUPPLY BY FLIR	Kline
21 JUN	17													OUTLINE VLS BLE 1D'D BY	Kline

NOTE: Reticule Units x Range (yards) x 0.000001 = Size (yards).  
0.00328

FLIR AS LONGLINER OR LOBSTER BOAT

APPENDIX D  
WEATHER LOGS AND PRECIPITABLE WATER VALUES

PAGE

CGC VIGOROUS-----D-3

CGC DECISIVE-----D-47

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DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4380B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL SYMBO

DAY

DATE

ZONE DESTINATION

USCGC VIGOROUS WMEC 627

FRIDAY

6 MAR 87

+ 5 ROMEC

## I. WEATHER OBSERVATIONS

TIME	MILES	TENDS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	10	5	280	5	10	CLR	30.48	37	32	0	-	30	250	1	-	-
02	10	4	280	5	10	CLR	30.49	36	31	0	-	-	280	1	-	-
03	10	4	280	5	10	CLR	30.49	36	31	0	-	-	280	1	-	-
04	10	2	280	5	10	CLR	30.48	35	33	0	-	-	250	1	-	-
05	11	2	270	6	10	CLR	30.49	35	33	0	-	-	250	1	-	-
06	13	5	280	5	10	CLR	30.49	35	33	0	-	30	240	1	-	-
07	10	1	280	4	7	CLR	30.50	35	32	0	-	-	245	1	-	-
08	9	0	280	4	8	CLR	30.49	34	33	0	-	-	245	1	-	-
09	MOORED															
10	U/W															
11	9	0	280	5	10	SCT	30.46	42	37	01	Ci	-	170	1	-	-
12	14	5	210	10	10	SCT	30.44	41	37	01	Ci	34	170	1	-	-
13	14	7	210	12	10	SCT	30.43	40	37	01	Cu	-	170	1	-	-
14	15	3	230	21	10	SCT	30.40	40	38	01	Ci	-	200	2	-	-
15	15	4	230	18	10	SCT	30.40	41	38	02	Ci	-	210	2	-	-
16	15	7	250	20	10	SCT	30.38	42	38	03	Ci	34	210	2	220	1
17	15	5	263	17	10	SCT	30.38	42	38	03	Ci	-	220	1	240	2
18	16	1	230	18	10	SCT	30.37	42	38	03	Ci	-	220	1	240	2
19	16	5	240	24	10	SCT	30.36	42	39	03	Ci	-	220	1	240	2
20	15	2	248	22	10	SCT	30.37	43	40	01	Ci	38	220	1	240	2
21	15	7	250	24	10	SCT	30.39	43	40	01	Ci	-	220	1	240	1
22	16	1	257	16	10	CLR	30.40	44	41	0	-	-	220	1	240	1
23	16	3	239	15	10	CLR	30.38	45	41	0	-	-	220	1	240	1
24	16	4	250	11	10	CLR	30.38	47	42	0	-	-	250	1	120	2
TOT	297	7														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YOKE	1. Held quarters.		1225	PAW
READINESS CONDITION	IV	2. Chronometer(s) wound.		1135	PAW
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	ORC
MISSION	L/E	4. Magazines inspected.		1030	BEF
		4a. Maximum temperature: 64°F		4b. Minimum temperature: 27°F	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
IAW MACHINERY LOGS		Began	Ended	Type	
		1230	1300	ABANDON SHIP	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					

## LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

**VESSEL**

USCGC

Vigorous WMEC 627

DAY

DATE \_\_\_\_\_

ZONE DESTINATION

SATURDAY

7 MAR 87

+ 5 ROMBS:

## 1. WEATHER OBSERVATIONS

[illegible]

## 11. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS			
MATERIAL CONDITION	YDKE	1. Held quarters.		1225	PAW			
READINESS CONDITION	III	2. Chronometer(s) wound.		1130	JRC			
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	JRC			
MISSION	L/E	4. Magazines inspected.		0835	JRC			
		4a. Maximum temperature: 65°		4b. Minimum temperature: 32°				
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING						
IAW MACHINERY LOGS		Began	Ended	Type				
		1735	1750	HOT STRESS LEAGUE				
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES								
- WAX FAX								
		D-4	Auth.	Attached	Leave	TAD	Other	On Board
SUNRISE 0624		SUNSET 1806						



DEPARTMENT OF TRANSPORTATION U. S. COAST GUARD CG-4380B (Rev. 3-67)				LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET												
VESSEL NAME				DAY		DATE		ZONE DESTINATION								
USCGC <i>Vigorous (WMEC-627)</i>				Sunday		8 MAR 82		+5 ROMEQ								
I. WEATHER OBSERVATIONS																
TIME	MILES	TENS	WINDS (if ESTIMATED)		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	13	0	125	35	10	OVC	29.96	70	65	10	NS	68	130	7	140	5
02	13	0	120	31	10	OVC	29.94	70	66	10	NS	68	130	8	140	5
03	13	1	120	32	10	OVC	29.92	70	66	9	CU	68	130	8	140	5
04	12	9	134	33	10	OVC	29.89	71	67	10	CU	71	140	5	140	7
05	13	9	137	37	10	SCT	29.85	71	68	4	CU	70	140	5	160	7
06	15	0	135	36	10	OVC	29.85	71	69	8	CU	71	140	4	160	6
07	15	0	160	33	10	BKN	29.85	73	70	7	CU	71	150	4	160	7
08	15	8	185	25	10	BKN	29.88	75	70	7	CU	70	170	4	100	5
09	15	8	200	25	10	OVC	29.89	75	70	10	CU	70	170	3	100	6
10	15	8	240	24	10	<del>OVC</del>	29.90	74	69	03	CU	70	230	3	170	6
11	15	9	220	21	10	SCT	29.92	76	68	04	CU	70	230	3	170	6
12	14	6	220	20	10	BKN	29.90	76	68	6	CU	68	230	3	080	4
13	15	1	230	20	10	SCT	29.87	76	68	4	CU	69	230	3	080	3
14	16	5	235	20	10	SCT	29.84	75	68	3	CU	72	230	3	180	3
15	15	0	220	20	10	SCT	29.84	75	67	3	CU	71	230	3	180	3
16	15	0	218	25	10	BKN	29.82	76	69	7	CU	71	190	2	210	3
17	14	9	259	30	10	OVC	29.82	76	69	7	CU	70	200	2	220	3
18	13	6	250	24	10	SCT	29.85	75	68	3	CU	71	230	2	230	2
19	13	4	252	18.5	10	BKN	29.86	75	66	6	CU	70	230	2	230	2
20	13	5	250	18	10	BKN	29.88	75	67	6	CU	70	240	2	240	2
21	12	4	260	30	10	SCT	29.89	74	65	4	CU	70	240	1	240	2
22	12	3	263	27	10	SCT	29.90	73	67	01	CU	70	250	1	250	2
23	13	7	280	15	10	SCT	29.92	70	65	01	CU	70	220	1	—	—
24	7	9	270	10	10	CLR	29.92	69	65	0	—	70	220	1	—	—
TOT	337	1														
II. OPERATIONAL SUMMARY																
STATUS AT 0001				CHECK LIST				TIME		INITIALS						
MATERIAL CONDITION <i>YOKE</i>				1. Held quarters.				1225		PAW						
READINESS CONDITION <i>II</i>				2. Chronometer(s) wound.				1100		PAW						
OPERATIONAL STATUS <i>ALPHA</i>				3. Held evening reports.				1945		GRC						
MISSION <i>L/E</i>				4. Magazines inspected.				0818		GRC						
				4a. Maximum temperature: <i>80°F</i>				4b. Minimum temperature: <i>57°F</i>								
MACHINERY CONDITION AND DISCREPANCIES				DRILLS AND TRAINING												
<i>IAW MACHINERY LOGS</i>				Began		Ended		Type								
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES																
				Auth.		Attached		Leave		TAD		Other		On Board		
SUNRISE <i>0629</i>				SUNSET <i>1822</i>				D-5								

DEPARTMENT OF TRANSPORTATION U. S. COAST GUARD CG-4380B (Rev. 3-67)				LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET																		
VESSEL <u>USCGC VIGOROUS WMEC-627</u>				DAY <u>Monday</u>		DATE <u>9 MAR 87</u>		ZONE/DESTINATION <u>+5 ROMEZ</u>														
I. WEATHER OBSERVATIONS																						
TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES							
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)						
01	7	9	230	10	10	CLR	29.92	68	64	0	-	70	230	1	-	-						
02	14	0	230	7	10	CLR	29.90	69	65	0	-	71	230	1	-	-						
03	12	3	230	7	10	SLT	29.90	69	65	1	CU	68	230	1	-	-						
04	14	5	241	9	10	CLR	29.90	70	65	0	-	68	230	1	-	-						
05	9	0	263	10	10	SLT	29.89	70	65	3	CU	68	210	1	-	-						
06	8	1	318	7	10	BKN	29.90	70	66	8	CU	69	210	1	-	-						
07	6	0	240	10	8	BKN	29.92	71	67	7	SC	69	-	-	-	-						
08	8	9	240	8	8	BKN	29.92	71	67	7	SC	69	-	-	-	-						
09	MOORED																					
10																						
11																						
12	MOORED		120	03	10	BKN	29.92	72	68	9	CU	-	-	-	-	-						
13																						
14																						
15																						
16	MOORED		300	07	10	BKN	29.84	74	68	7	SC	-	-	-	-	-						
17																						
18																						
19																						
20	MOORED		240	05	10	CLR	29.84	70	65	0	-	-	-	-	-	-						
21																						
22	MOORED																					
23																						
24	MOORED		240	05	10	SLT	29.86	68	63	3	CU	-	-	-	-	-						
TOT	80	7																				
II. OPERATIONAL SUMMARY																						
STATUS AT 0001							CHECK LIST				TIME		INITIALS									
MATERIAL CONDITION <u>YOKE</u>							1. Held quarters.				1225		B214									
READINESS CONDITION <u>III</u>							2. Chronometer(s) wound.				-		-									
OPERATIONAL STATUS <u>ALPHA</u>							3. Held evening reports.				1945		B24									
MISSION <u>L/E</u>							4. Magazines inspected.				1100		B211									
							4a. Maximum temperature: <u>80°F</u>				4b. Minimum temperature: <u>68°F</u>											
MACHINERY CONDITION AND DISCREPANCIES							DRILLS AND TRAINING															
<u>IAW MACHINERY LOG &amp; LOGS</u>							Began		Ended		Type											
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES																						
SUNRISE <u>0630</u>							SUNSET <u>1827</u>		D-6		Auth.		Attached		Leave		TAD		Other		On Board	

AD-A194 592

EVS7 EVALUATION OF SHIPBOARD ELECTRO-OPTICAL APPARATUS

2/2

FOR USE IN LAW ENF. (U) COAST GUARD RESEARCH AND

DEVELOPMENT CENTER GROTON CT F REFLOGLE DEC 87

UNCLASSIFIED

CGR/DC-18/87 USCG-D-87-88

F/G 17/5.1

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END

DATE

FORMED

88



DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4380B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL NAME

DAY

DATE

ZONE DESTINATION

USCGC VIGOROUS (WMEC 627)

WEDNESDAY 11 MAR 87 +5 ROME

## I. WEATHER OBSERVATIONS

TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01																
02																
03																
04	MOORED		270	10	05	CLR/H	30.01	62	57	0	-	-	-	-	-	-
05																
06																
07																
08	MOORED		340	8	06	H	30.08	64	59	0	-					
09	9	6	350	14	07	CLR/H	30.08	70	65	0	-		350	2	000	2
10	15	5	330	17	08	CLR/H	30.08	72	66	0	-	62	350	7	010	2
11	5	3	340	18	10	CLR	30.10	72	66	0	-		340	2	000	1
12	6	1	350	16	10	SET	30.10	71	65	1	CU		350	1	000	3
13	8	4	000	12	10	SET	30.08	71	63	1	CU	70	350	1	000	3
14	2	7	022	11	10	SET	30.07	74	64	1	CU	70	010	1	000	3
15	5	0	030	14	8	CLR	30.06	77	66	0	-	71	010	1	000	2
16	2	1	045	12	10	CLR	30.05	75	66	0	-	70	010	1	000	2
17	11	7	054	17	10	CLR	30.06	72	65	0	-	70	010	1	000	2
18	4	5	035	21	10	CLR	30.06	71	63	0	-	70	010	1	000	2
19	4	0	028	16	10	CLR	30.08	70	62	0	-	70	010	1	010	3
20	6	4	020	15	10	CLR	30.08	70	61	2	CU	70	010	1	000	3
21	13	1	035	14	10	CLR	30.08	70	60	1	CU	71	010	1	000	3
22	15	6	030	13	10	SET	30.08	70	63	4	CU	70	010	1	020	2
23	15	7	050	7	10	SET	30.10	68	62	2	CU	71	040	1	020	1
24	16	3	060	9	10	SET	30.10	69	62	4	CU	70	040	1	020	1
TOT	142	0														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST	TIME	INITIALS
MATERIAL CONDITION	YOKE	1. Held quarters.	0745	TAW
READINESS CONDITION	II	2. Chronometer(s) wound.	-	-
OPERATIONAL STATUS	B-6	3. Held evening reports.	-	-
MISSION	HMIO	4. Magazines inspected.	71159	571241W
		4a. Maximum temperature:	78°F	
		4b. Minimum temperature:	57°F	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING		
TAW MACHINERY LOGS		Began	Ended	Type
		0945	1210	HELO OPS / LOW VES APPROACH
		1325	1547	HELO OPS - HELD DIRCH
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES				
SUNRISE 0618		SUNSET 1758		
		D-7	Auth.	Attached
		Leave	TAD	Other
		On Board		

LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

**DAY**

DATE

ZONE DESTINATION

USCGC VIGOROUS (WMEC 627)

THURSDAY

12 MAY 2007

+ 5 Rmfc

[illegible]

STATUS AT 0001		CHECK LIST		TIME	INITIALS			
MATERIAL CONDITION	Yoke	1. Held quarters.		1600	Bef			
READINESS CONDITION	<u>IV</u>	2. Chronometer(s) wound.		1126	PAW			
OPERATIONAL STATUS	Cat Alpha	3. Held evening reports.		1945	Bef			
MISSION	LE Pat	4. Magazines inspected.		0834	PAW			
		4a. Maximum temperature:		767°F				
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING						
1400 MACHINERY LOGS		Began	Ended	Type				
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES								
SUNRISE 0621	SUNSET 1822	D-8	Auth.	Attached	Leave	TAD	Other	On Board

LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL NAME

USCGC VIGOROUS (WMEC 627)

DAY

FRI. DAY

DATE

13 MAR 87

ZONE DESTINATION

+ S ROMEO

I. WEATHER OBSERVATIONS

TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	7	8	350	14	10	OVC	30.01	71	65	10	Cu	71	340	1	000	2
02	7	2	348	16	10	OVC	29.99	71	64	10	Cu	70	340	1	000	2
03	7	2	338	19	10	OVC	29.98	71	64	10	Cu	70	340	1	350	2
04	6	7	357	16	10	OVC	29.98	71	64	10	Cu	70	340	1	350	2
05	7	5	012	12	10	BKN	29.99	70	63	7	Cu	70				
06	6	2	340	11	10	BKN	29.99	70	63	6	Cu	70	330	1	000	5
07	7	9	002	14	10	BKN	30.00	70	63	6	Cu	69	335	1	000	5
08	6	8	335	11	10	SCt	30.00	71	63	4	Cu	-	335	1	000	3
09	7	2	350	14	10	SCt	30.01	73	64	4	Cu	70	340	1	000	3
10	5	8	320	11	10	BKN	30.01	73	64	7	Cu	-	320	1	010	3
11	4	0	310	7	10	BKN	30.01	75	65	9	Cu	71	320	1	010	3
12	3	9	330	7	10	BKN	29.98	76	66	8	Cu	71	340	1	350	2
13	5	7	320	8	10	BKN	29.97	76	66	6	Cu	70	330	1	010	3
14	7	0	010	9	10	BKN	29.94	75	65	6	Cu	70	320	1	000	3
15	7	4	340	7	10	BKN	29.92	75	65	8	Cu	71	320	1	000	3
16	7	2	164	8	10	BKN	29.90	75	65	8	Cu	72	330	1	350	4
17	7	4	175	6	10	BKN	29.91	73	65	8	Cu	71	330	1	350	4
18	7	0	190	7	10	OVC	29.93	72	65	10	Cu	71	300	1	340	4
19	8	3	185	7	10	OVC	29.94	72	65	10	Cu	70	-	-	340	4
20	7	1	035	11	10	OVC	29.94	70	65	10	Cu	71	-	-	015	3
21	7	5	040	15	10	OVC	29.94	70	65	10	Cu	70	040	1	045	3
22	8	0	010	23	1	OVC/R	29.94	70	65	10	-	72	010	2	045	3
23	7	0	010	22	3	OVC/R	29.95	68	63	10	Cu	71	010	2	045	3
24	7	5	020	22	4	OVC/R	29.95	67	62	10	Cu	69	010	2	045	3
TOT	165	3														

II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	Yoke	1. Held quarters.		1230	ECF
READINESS CONDITION	IV	2. Chronometer(s) wound.		0830	PAW
OPERATIONAL STATUS	Alpha	3. Held evening reports.		1945	PAW
MISSION	HMIO	4. Magazines inspected.		0950	PAW
		4a. Maximum temperature:	76°F	4b. Minimum temperature:	62°F
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
1AW MACHINERY LOGS		Began	Ended	Type	
		10/8	1120	4E - BOAT OPS	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
SUNRISE 0613		SUNSET 1805	D-9	Auth.	Attached
				Leave	TAD
				Other	On Board

## LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

~~YESSELIAN~~

USCGC VIGOROUS (WMEC 627)

**DAY**

SATURDAY

DATE \_\_\_\_\_

19 May 81

ZONE DESTINATION

$$+ \int R_{\text{mic}}$$

## 1. WEATHER OBSERVATIONS

[illegible]

## 11. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YOKE	1. Held quarters.		1230	BCE
READINESS CONDITION	<u>IV</u>	2. Chronometer(s) wound.		1100	PAW
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	BCE
MISSION	HM10	4. Magazines inspected.		1130	PAW
		4a. Maximum temperature:		80°F	4b. Minimum temperature: 64°F
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
1AW MACHINERY LOGS		Began	Ended	Type	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
A1/LAT-33 XATR					
A1/LAR-9					
SUNRISE	6:07	SUNSET	1809	D-10	
				Auth.	Attached
				Leave	TAD
				Other	On Board



DAY

DATE \_\_\_\_\_

ZONE DESTINATION

SUNDAY

15 MAR 87

+5 Romeo

## 1. WEATHER OBSERVATIONS

## 11. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS				
MATERIAL CONDITION	YOKE	1. Held quarters.		1225	QRC				
READINESS CONDITION	TU	2. Chronometer(s) wound.		1125	BCF				
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	BCF				
MISSION	HMIO	4. Magazines inspected.		0945	BCF				
		4a. Maximum temperature: 84°		4b. Minimum temperature: 69°					
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING							
HAW MACHINERY LOGS		Began	Ended	Type					
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES									
AN/LES-23 X-ATR									
AN/LES-2									
SUNRISE 0604		D-11		Auth.	Attached	Leave	TAD	Other	On Board
SUNSET 1802									

LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL NAME

USCGC VIGOROUS (WMEC 627)

DAY

Monday

DATE

16 MAR 87

ZONE DESTINATION

+5 Romeo

I. WEATHER OBSERVATIONS

TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	7	1	060	15	10	BKN	29.95	76	76	06	CI	72	060	1	030	2
02	7	5	181	6	10	BKN	29.95	76	76	07	CU	72	060	1	—	—
03	6	7	235	2	10	BKN	29.94	77	72	06	CU	74	060	1	—	—
04	8	2	080	4	10	SCT	29.94	77	72	05	CU	73	060	.5	—	—
05	7	8	080	5	10	SCT	29.94	76	70	03	CU	72	—	—	—	—
06	5	8	080	5	08	SCT/H	29.96	75	71	02	CU	72	060	.5	—	—
07	6	2	090	8	03	SCT/H	29.98	75	69	04	CU	72	090	1	—	—
08						BKN	29.97	85	—	05	CU					
09	MOORED															
10	U/W															
11	12	5	270	3	10	BKN	29.97	85	74	05	CU	76	—	—	—	—
12	15	9	272	3.5	10	BKN	29.97	85	75	05	CU	76	—	—	—	—
13	11	6	310	5	10	BKN	29.97	84	73	05	CU	76	350	.5	—	—
14	12	0	329	7	10	BKN	29.92	82	72	05	CU	74	335	.5	—	—
15	14	2	309	6	10	BKN	29.91	81	71	06	CU	76	335	1	—	—
16	175	2	300	7	10	SCT	29.90	80	72	4	CI	74	300	1	—	—
17	13	8	010	12	10	SCT	29.90	80	73	4	CI	74	351	2	310	1
18	13	7	020	23	10	SCT	29.89	76	73	2	CI	74	030	4	035	3
19	10	6	022	19	10	SCT	29.92	76	71	3	CI	74	022	2	035	3
20	6	3	030	20	10	SCT	29.94	76	73	2	CI	73	030	2	035	2
21	10	1	053	34	10	SCT	29.94	76	72	2	CI	73	030	2	020	2
22	11	0	088	35	10	SCT	29.95	76	72	3	CI	72	040	2	030	3
23	11	1	088	23	10	SCT	29.95	76	72	4	CU	72	060	1	050	3
24	9	0	075	16	10	BKN	29.94	76	72	7	CU	72				
TOT	204	0														

II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	Yoke	1. Held quarters.		0940	Bef
READINESS CONDITION	TV	2. Chronometer(s) wound.		1130	ACF
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	Bef
MISSION	HMIC	4. Magazines inspected.		1127	Bef
		4a. Maximum temperature:		4b. Minimum temperature:	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
IAN MACHINERY LOGS		Began	Ended	Type	
		1235	1251	MAN OVER BOARD	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
AN/URC-22 KASH					
AN/URC-9					
SUNRISE 0604		SUNSET 1804	D-12	Auth.	Attached
				Leave	TAD
				Other	On Board

**GAY**

DATE \_\_\_\_\_

ZONE DESTINATION

TUESDAY

17 MAR 87

+ 5 ROMEO
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## 1. WEATHER OBSERVATIONS

56

## 11. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	Yoke	1. Held quarters.		1225	JRC
READINESS CONDITION	IV	2. Chronometer(s) wound.		1201	JRC
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		2045	JRC
MISSION	HM10	4. Magazines inspected.		0900	BRF
		4a. Maximum temperature:		4b. Minimum temperature:	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
HMW MACHINERY LOGS		Began	Ended	Type	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
AN/ART-23 RATR					
AN/ARC-9					
SUNRISE 06538		D-13		Auth.	Attached
SUNSET 1809				Leave	TAD
				Other	On Board

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4380B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL *Station*

DAY

DATE

ZONE DESTINATION

USCGC *Vigorous WMEC 627* *WEDNESDAY 12 MARCH* *TS RENE*

## I. WEATHER OBSERVATIONS

TIME	MILES	TENS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	14	0	070	14	10	BKN	29.95	76	72	7	C	72	080	3	110	2
02	9	4	080	13	10	SCT	29.92	76	72	5	C	72	080	3	100	2
03	12	1	095	10	10	BKN	29.91	76	71	6	Cu	72	090	2	100	2
04	9	9	115	6	10	SCT	29.91	76	71	5	Cu	71	090	2	110	2
05	11	0	118	5	10	SCT	29.91	76	71	3	Cu	71	100	1	090	2
06	11	0	092	19	10	SCT	29.92	77	71	4	Cu	71	060	1	070	2
07	10	8	102	21	10	BKN	29.96	77	72	5	Cu	68	110	1	095	3
08	11	2	100	20	10	BKN	29.96	77	72	5	Cu	68	115	1	100	3
09	10	7	063	16.5	10	BKN	29.98	78	73	5	Cu	73	100	1	090	3
10	11	9	060	12.0	10	BKN	29.98	81	75	5	Cu	73	080	1	105	3
11	12	0	079	14.5	10	SCT	29.97	81	73	3	Cu	73	080	1	105	3
12	9	8	040	12	10	SCT	29.94	80	74	2	Cu	73	090	1	100	2
13	9	2	090	18	10	SCT	29.93	82	75	2	Cu	73	090	2	100	1
14	12	3	083	27	10	SCT	29.91	83	74	3	Cu	70	083	2	070	2
15	8	9	085	25	10	SCT	29.88	82	74	2	Cu	72	080	2	070	2
16	1	5	070	18	10	SCT	29.90	79	72	3	Cu	72	070	2	060	3
17	2	1	085	17	10	SCT	29.90	79	72	3	Cu	72	060	2	080	2
18	13	2	080	16	10	SCT	29.92	77	71	3	Cu	71	060	2	070	2
19	12	7	080	22	10	SCT	29.92	75	70	3	Cu	71	060	2	080	2
20	4	0	092	32	10	SCT	29.92	77	71	3	Cu	71	065	4	—	—
21	10	8	084	34	10	CLR	29.94	76	70	0	—	73	070	4	—	—
22	11	0	084	33	10	SCT	29.96	76	70	3	Cu	72	070	4	—	—
23	10	3	105	22	10	SCT	29.96	76	70	1	Cu	72	080	4	—	—
24	10	5	100	19	10	CLR	29.94	76	72	0	—	72	080	3	090	2
TOT	240	3														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	<i>POKE</i>	1. Held quarters.		1225	<i>PAW</i>
READINESS CONDITION	<i>II</i>	2. Chronometer(s) wound.		1127	<i>RC</i>
OPERATIONAL STATUS	<i>ALPHA</i>	3. Held evening reports.		2030	<i>RC</i>
MISSION	<i>LE/HMIO</i>	4. Magazines inspected.		0855	<i>RC</i>
		4a. Maximum temperature:	<i>79°F</i>	4b. Minimum temperature:	<i>70°F</i>
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
<i>RAW MACHINERY LOGS</i>		Began	Ended	Type	
		<i>1315</i>	<i>1411</i>	<i>GENERAL RUNNERS DEVL</i>	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
<i>AN/USP-23 VHF</i>					
<i>USC-9 VHF</i>					
SUNRISE <i>0600</i>		SUNSET <i>1804</i>	D-14	Auth.	Attached
				Leave	TAD
				Other	On Board

LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL NAME

USCGC

VIGOROUS WMEC 627

DAY

THURSDAY

DATE

19 MAR 87

ZONE DESTINATION

TSR060

1. WEATHER OBSERVATIONS

TIME	MILES	TENS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER Symbols	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	11	4	090	22	10	CLR	29.94	76	71	0	-	72	090	3	100	2
02	11	6	090	26	10	CLR	29.88	76	71	2	CU	71	090	3	100	2
03	11	9	085	26	10	SCT	29.87	76	72	3	CU	72	090	3	100	2
04	13	5	095	20	10	SCT	29.88	77	72	3	CU	72	090	2	090	2
05	13	5	095	20	10	SCT	29.88	77	72	3	CU	71	090	2	090	2
06	14	5	095	26	10	BKN	29.90	77	72	7	CU	71	090	2	075	2
07	14	8	100	22	10	SCT	29.91	77	72	3	CU	71	095	2	080	2
08	16	0	110	27	10	BKN	29.92	77	72	5	CU	72	100	1	080	4
09	14	0	110	24	10	BKN	29.92	77	72	6	CU	72	100	2	080	3
10	14	8	100	35	10	SCT	29.92	77	71	1	CU	72	100	2	080	3
11	14	9	090	32	10	SCT	29.91	78	72	2	CU	72	090	2	080	3
12	10	7	095	33	10	SCT	29.92	78	73	2	CU	72	095	2	080	3
13	13	2	090	29	10	SCT	29.87	80	74	1	CU	73	100	2	080	3
14	2	8	095	20	10	SCT	29.85	80	74	1	CU	72	100	2	080	3
15	1	9	095	20	10	SCT	29.85	78	72	1	CU	72	090	2	080	2
16	1	5	080	20	10	SCT	29.83	79	73	3	CU	72	080	2	060	3
17	1	4	090	20	10	BKN	29.83	78	73	6	CU	70	080	2	060	3
18	3	5	075	22	10	BKN	29.84	77	72	6	CU/KI	72	075	2	065	3
19	1	0	110	21	10	BKN	29.85	77	73	7	CU	71	075	2	065	3
20	10	5	120	28	10	BKN	29.84	77	73	7	CU	72	075	2	065	3
21	9	1	122	26	10	BKN	29.88	77	73	5	CU	72	075	2	065	3
22	5	6	120	24	10	SCT	29.88	77	73	02	CU	72	080	.5	075	3
23	10	8	120	23	10	SCT	29.87	77	73	02	CU	72	080	1	075	3
24	14	4	120	22	10	SCT	29.85	77	72	01	CU	72	080	1	075	2
TOT	237	3														

11. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YOKIE	1. Held quarters.		1225	RAW
READINESS CONDITION	IV	2. Chronometer(s) wound.		1130	RAW
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	RC
MISSION	4/E, HMIC	4. Magazines inspected.		0842	RC
		4a. Maximum temperature:	81°	4b. Minimum temperature:	70°
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
1AW MACHINERY LOGS.		Began	Ended	Type	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
SUNRISE	0558	SUNSET	1756	D-15	
				Auth.	
				Attached	
				Leave	
				TAD	
				Other	
				On Board	

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4380B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL NAME

DAY

DATE

ZONE DESTINATION

USCGC

VIGOROUS (WMEC-627)

Friday

24 MAR 87

T 5 COMEC

## I. WEATHER OBSERVATIONS

TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIREC- TION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIREC- TION True	HEIGHT (Feet)	DIREC- TION True	HEIGHT (Feet)
01	14	8	194	12	10	SCCT	29.84	77	72	2	CU	72	194	1	045	2
02	15	0	250	9	10	SCCT	29.83	77	72	3	CU	72	250	1	075	2
03	14	9	254	10	10	CLR	29.82	77	72	0	-	72	250	1	070	2
04	14	9	235	12	10	CLR	29.82	77	73	0	-	71	-	-	070	2
05	15	0	258	10	10	CLR	29.83	78	74	0	-	71	-	-	250	2
06	15	0	274	19	10	SCCT	29.84	78	74	1	CU	71	230	1	000	2
07	15	0	275	21	10	SCCT	29.87	80	75	2	CU	71	260	1	240	2
08	14	0	261	06	10	SCCT	29.89	82	75	3	CU	72	250	1	100	2
09	15	7	286	24	10	SCCT	29.88	82	75	4	CU	72	260	1	110	2
10	9	9	275	10	10	SCCT	29.89	83	76	4	CU	74	260	1	120	3
11	6	5	268	09	10	SCCT	29.87	84	76	2	CU	74	270	1	120	3
12	10	8	260	9	10	SCCT	29.86	84	76	1	CU	74	260	1	220	1
13	11	1	250	5	10	CLR	29.84	84	75	0	-	73	210	1	080	1
14	2	8	230	8	10	CLR	29.82	83	75	0	-	73	200	1	200	1
15	2	1	200	12	10	CLR	29.81	81	75	0	-	73	190	1	190	1
16	7	0	236	11.5	10	CLR	29.80	81	76	0	-	74	190	.5	220	1
17	6	1	281	10	10	SCCT	29.81	80	75	1	CU	73	200	.5	230	2
18	7	9	276	6.2	10	SCCT	29.82	79	75	2	CU	73	200	.5	230	2
19	4	9	275	6	10	SCCT	29.84	79	75	1	CU	73	200	.5	230	2
20	3	2	280	8	10	CLR	29.84	78	75	0	-	73	200	.5	230	2
21	7	2	255	7	10	CLR	29.84	78	75	0	-	72	250	1	230	2
22	3	1	290	6	10	CLR	29.85	78	74	0	-	72	-	-	230	2
23	1	0	310	7	10	CLR	29.84	77	75	0	-	73	-	-	300	1
24	0	7	310	7	10	SCCT	29.84	78	74	1	CU	73	-	-	300	1
TOT	210	6														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST	TIME	INITIALS
MATERIAL CONDITION	YOKE	1. Held quarters.	1225	PAW
READINESS CONDITION	TV	2. Chronometer(s) wound.	1130	PAW
OPERATIONAL STATUS	ALPHA	3. Held evening reports.	1945	PAW
MISSION	L/E, HMIO	4. Magazines inspected.	1157	PAW
		4a. Maximum temperature: 81°F	4b. Minimum temperature: 70°F	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING		
1AW MACHINERY LOGS.		Began	Ended	Type
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES				
4/10/87 - 23 RAR				
4/10/87 - 9 UAF				
SUNRISE	0556	SUNSET	1810	
		D-16	Auth.	Attached
		Leave	TAD	Other
		On Board		

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4380B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL NAME

USCGC VIGOROUS (WMEC 627)

DAY

SATURDAY 21 MAR 87

DATE

ZONE DESTINATION

+5 ROMEO

## I. WEATHER OBSERVATIONS

TIME	MILES	TENDERS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	0	7	295	12	10	CLR	29.82	78	72	0	--	74	295	.5	300	1
02	5	0	352	13	10	CLR	29.80	78	73	0	-	74	352	.5	310	1
03	8	0	000	12	10	CLR	29.80	77	73	0	-	76	000	.5	310	1
04	7	6	045	6	10	CLR	29.81	77	73	0	-	76	-	0	330	1
05	7	0	047	7.4	10	SC	29.82	77	73	02	CU	72	-	-	300	1
06	7	1	055	8	10	BKN	29.83	77	74	06	CU	72	-	-	320	1
07	6	6	060	7	10	SC	29.84	82	76	1	CU	74	-	-	320	1
08	1	2	000	5	10	SC	29.85	87	79	1	CU	74	-	-	320	.5
09	1	4	040	3	10	SC	29.88	90	80	1	CU	73	-	-	320	.5
10	1	5	070	4	10	CLR	29.87	90	80	1	CU	73	-	-	-	-
11	4	5	CALM		10	CLR	29.86	92	81	0	-	72	-	-	-	-
12	5	8	Calm		10	CLR	29.84	93	80	0	-	72	-	-	-	-
13	4	2	Calm		10	CLR	29.81	92	79	0	-	72	-	-	-	-
14	3	8	Calm		10	CLR	29.79	90	78	0	-	72	-	-	-	-
15	1	2	LIGHT VARIABLE		10	SC	29.79	90	78	1	CU/Ci	77	-	-	-	-
16	2	7	CALM		10	SC	29.78	92	78	1	CU/Ci	76	-	-	-	-
17	6	9	032	05	10	SC	29.78	85	76	1	CU	75	-	-	-	-
18	8	2	020	10	10	SC	29.78	80	73	4	CU	75	-	-	-	-
19	2	0	012	13.5	10	SC	29.78	80	75	1	CU	75	-	-	-	-
20	7	4	050	10	10	CLR	29.78	79	74	0	-	75	-	-	-	-
21	6	2	025	11	10	CLR	29.80	79	75	0	-	75	025	1	-	-
22	7	2	024	14	10	CLR	29.82	79	75	0	-	74	020	2	-	-
23	7	1	030	12	10	CLR	29.80	79	74	0	-	73	020	2	-	-
24	7	5	074	12	10	CLR	29.78	79	74	0	-	73	080	1	080	1
TOT	121	8														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	Yoke	1. Held quarters.		1240	REF
READINESS CONDITION	IV	2. Chronometer(s) wound.		1000	PAW
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	PAW
MISSION	LE-HMIO	4. Magazines inspected.		PAW/MSHAW	
		4a. Maximum temperature:	87°F	4b. Minimum temperature:	
				71°F	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
JAW MACHINERY LOGS		Began	Ended	Type	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
M/CUT 28: 2500					
M/C-9 4NF					
SUNRISE 0554		D-17		Auth.	Attached
SUNSET 1800				Leave	TAD
				Other	On Board

## LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

ZONE DESTINATION

+ J. R. R. R.

## 11. OPERATIONAL SUMMARY

## INITIALS

1110	Bcf
1130	IRAN
1945	Bcf
1215	Bcf

4b. Minimum temperature:  
72°F

## DRILLS AND TRAINING

Began	Ended	Type
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AW/457-23 x mpe  
WRC-9 4HF

D-18	Auth.	Attached	Leave	TAD	Other	On Board
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SUNSET. 1810



## LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

**YES**

DAY

DATE \_\_\_\_\_

ZONE DESTINATION

USCGC VIGOROUS (WMEC 627)

Monday

23 Apr 87

+5 Roman

## 1. WEATHER OBSERVATIONS

[illegible]

## 11. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	Yoke	1. Held quarters.		1230	Bcf
READINESS CONDITION	TV	2. Chronometer(s) wound.		1120	Bcf
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	Bcf
MISSION	HALO/LE	4. Magazines inspected.		0748	PAW
		4a. Maximum temperature: 87°F		4b. Minimum temperature: 73°F	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
1AW MACHINERY LOGS		Began	Ended	Type	
		1043	1154	RUBBER DOCKING	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
AN/UR-23 XMR					
UR-9 UHF					
SUNRISE 0555		D-19		Auth.	Attached
SUNSET 1803				Leave	TAD
				Other	On Board

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4380B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL NAME

USCGC VIGOROUS (WMEC 627)

DAY

TUESDAY

DATE

24 MAR 87

ZONE DESTINATION

+5 Romeo

## I. WEATHER OBSERVATIONS

TIME	MILES	TENTS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB				DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	10	1	074	21	10	BKN	29.79	76	73	08	CU	74	050	1	080	2
02	10	8	070	20	10	BKN	29.76	76	73	08	CU	74	050	1	070	2
03	12	7	057	10	10	SC	29.74	77	73	03	CU	74	050	1	070	2
04	11	2	080	17	10	SC	29.74	78	74	4	CU	74	080	1	110	2
05	5	5	080	17	10	SC	29.76	78	74	5	CU	73	080	2	050	3
06	10	1	040	18	10	OC	29.76	77	74	10	CU	73	090	3	080	2
07	10	0	090	15	10	BKN	29.80	77	74	7	CU	73	090	1	090	2
08	MOORED															
09																
10																
11																
12	MOORED	140		05	10	SC	29.81	83	77	3	CU	-	-	-	-	-
13																
14																
15																
16	MOORED	135	12	10	CLR	29.80	86	79	0	-	-	-	-	-	-	-
17																
18																
19																
20	MOORED	130	8	10	CLR	29.78	80	76	0	-	-	-	-	-	-	-
21																
22																
23																
24	MOORED	100	3	10	CLR	29.76	77	74	0	-	-	-	-	-	-	-
TOT	70	4														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YOKE	1. Held quarters.		1220	PAW
READINESS CONDITION	IV	2. Chronometer(s) wound.		-	-
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	PAW
MISSION	HMC/LC	4. Magazines inspected.		85	73
		4a. Maximum temperature:	85°F	4b. Minimum temperature:	
				73°F	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
JAW MACHINERY LOGS		Began	Ended	Type	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
HMC/LC - 23 MAR					
HMC - 7 MAR					
SUNRISE 0603	SUNSET 1813	D-20	Auth.	Attached	Leave
			TAD	Other	On Board

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4380B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL STATION

USCGC *V. ...*

*WMEC - 627*

DAY

DATE

ZONE DESTINATION

*WIDUROM 25 MAR 87*

*JS REMEC*

## I. WEATHER OBSERVATIONS

TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01																
02																
03																
04	<i>MAKRO</i>		<i>CA</i>	<i>LM</i>	<i>10</i>	<i>CLR</i>	<i>29.80</i>	<i>76</i>	<i>73</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>
05																
06																
07																
08	<i>U/W</i>															
09	<i>16</i>		<i>CA</i>	<i>LM</i>	<i>10</i>	<i>CLR</i>	<i>29.91</i>	<i>82</i>	<i>75</i>	<i>0</i>	<i>-</i>	<i>73</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>
10	<i>8</i>	<i>0</i>	<i>060</i>	<i>8</i>	<i>10</i>	<i>SC</i>	<i>29.92</i>	<i>83</i>	<i>83</i>	<i>2</i>	<i>CU</i>	<i>73</i>	<i>060</i>	<i>.5</i>	<i>130</i>	<i>3</i>
11	<i>14</i>	<i>8</i>	<i>090</i>	<i>25</i>	<i>10</i>	<i>SC</i>	<i>29.91</i>	<i>81</i>	<i>74</i>	<i>1</i>	<i>CU</i>	<i>74</i>	<i>090</i>	<i>1</i>	<i>090</i>	<i>2</i>
12	<i>15</i>	<i>3</i>	<i>070</i>	<i>35</i>	<i>10</i>	<i>SC</i>	<i>29.90</i>	<i>81</i>	<i>76</i>	<i>1</i>	<i>CU</i>	<i>74</i>	<i>080</i>	<i>2</i>	<i>070</i>	<i>6</i>
13	<i>12</i>	<i>5</i>	<i>070</i>	<i>21</i>	<i>10</i>	<i>SC</i>	<i>29.89</i>	<i>83</i>	<i>77</i>	<i>2</i>	<i>CU</i>	<i>74</i>	<i>080</i>	<i>2</i>	<i>070</i>	<i>6</i>
14	<i>10</i>	<i>4</i>	<i>067</i>	<i>23</i>	<i>10</i>	<i>SC</i>	<i>29.86</i>	<i>83</i>	<i>77</i>	<i>3</i>	<i>CU</i>	<i>74</i>	<i>070</i>	<i>2</i>	<i>070</i>	<i>6</i>
15	<i>10</i>	<i>7</i>	<i>051</i>	<i>16</i>	<i>10</i>	<i>SC</i>	<i>29.86</i>	<i>82</i>	<i>76</i>	<i>6</i>	<i>CU</i>	<i>73</i>	<i>070</i>	<i>2</i>	<i>070</i>	<i>6</i>
16	<i>6</i>	<i>2</i>	<i>060</i>	<i>23</i>	<i>10</i>	<i>SC</i>	<i>29.86</i>	<i>83</i>	<i>77</i>	<i>4</i>	<i>CU</i>	<i>74</i>	<i>060</i>	<i>2</i>	<i>070</i>	<i>4</i>
17	<i>8</i>	<i>2</i>	<i>070</i>	<i>28</i>	<i>10</i>	<i>SC</i>	<i>29.90</i>	<i>82</i>	<i>77</i>	<i>4</i>	<i>CU</i>	<i>73</i>	<i>060</i>	<i>2</i>	<i>060</i>	<i>4</i>
18	<i>7</i>	<i>2</i>	<i>070</i>	<i>28</i>	<i>10</i>	<i>SC</i>	<i>29.90</i>	<i>80</i>	<i>74</i>	<i>3</i>	<i>CU</i>	<i>72</i>	<i>060</i>	<i>2</i>	<i>060</i>	<i>4</i>
19	<i>7</i>	<i>3</i>	<i>060</i>	<i>25</i>	<i>10</i>	<i>SC</i>	<i>29.91</i>	<i>77</i>	<i>73</i>	<i>3</i>	<i>CU</i>	<i>74</i>	<i>060</i>	<i>2</i>	<i>060</i>	<i>4</i>
20	<i>8</i>	<i>2</i>	<i>064</i>	<i>18</i>	<i>10</i>	<i>CLR</i>	<i>29.96</i>	<i>77</i>	<i>72</i>	<i>0</i>	<i>-</i>	<i>74</i>	<i>060</i>	<i>1</i>	<i>060</i>	<i>3</i>
21	<i>8</i>	<i>1</i>	<i>072</i>	<i>24</i>	<i>10</i>	<i>SC</i>	<i>29.97</i>	<i>77</i>	<i>72</i>	<i>1</i>	<i>CU</i>	<i>73</i>	<i>060</i>	<i>1</i>	<i>060</i>	<i>3</i>
22	<i>8</i>	<i>0</i>	<i>070</i>	<i>24</i>	<i>10</i>	<i>SC</i>	<i>29.97</i>	<i>77</i>	<i>72</i>	<i>2</i>	<i>CU</i>	<i>73</i>	<i>060</i>	<i>1</i>	<i>060</i>	<i>3</i>
23	<i>8</i>	<i>0</i>	<i>068</i>	<i>25</i>	<i>10</i>	<i>SC</i>	<i>29.98</i>	<i>76</i>	<i>71</i>	<i>4</i>	<i>CU</i>	<i>72</i>	<i>060</i>	<i>1</i>	<i>060</i>	<i>3</i>
24	<i>5</i>	<i>1</i>	<i>097</i>	<i>8</i>	<i>10</i>	<i>SC</i>	<i>29.97</i>	<i>74</i>	<i>69</i>	<i>1</i>	<i>CU</i>	<i>74</i>	<i>060</i>	<i>1</i>	<i>060</i>	<i>3</i>
TOT	<i>139</i>	<i>10</i>														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	<i>YOKE</i>	1. Held quarters.		<i>0740</i>	<i>MSF</i>
READINESS CONDITION	<i>IV</i>	2. Chronometer(s) wound.		<i>1110</i>	<i>BSF</i>
OPERATIONAL STATUS	<i>BRAND-6</i>	3. Held evening reports.		<i>1125</i>	<i>GRG</i>
MISSION	<i>HMNO - L/E</i>	4. Magazines inspected.		<i>1118</i>	<i>BSF</i>
		4a. Maximum temperature:	<i>78°</i>	4b. Minimum temperature:	<i>73°</i>
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
<i>1AW MACHINERY LOGS</i>		Began	Ended	Type	
		<i>0851</i>	<i>0925</i>	<i>LOWERS PLANT</i>	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
<i>AN/URT-22 XMR</i>					
<i>YRC-9 YMF</i>					
		D-21	Auth.	Attached	Leave
				TAD	Other
					On Board
SUNRISE	<i>0605</i>	SUNSET	<i>1809</i>		

## LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

**VERBODEN TOEGANG**

DAY

DATE \_\_\_\_\_

ZONE DESTINATION

USCGC VIGOROUS (WMEC 627)

THURSDAY

26 Mar 87

+5 Romeo

## 1. WEATHER OBSERVATIONS

[illegible]

## 11. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YOKE	1. Held quarters.		1225	RC
READINESS CONDITION	IV	2. Chronometer(s) wound.		1113	BCF
OPERATIONAL STATUS	BAND CHARLIE	3. Held evening reports.		1945	RC
MISSION	HANOI/LE	4. Magazines inspected.		0940	BCF
		4a. Maximum temperature:		82°F	4b. Minimum temperature:
					70°F
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
IAW MACHINERY LOGS		Began	Ended	Type	
		1348	1457	GQ - BATTLE PROBLEM	
		1415	1450	SIGNALS - CHALLENGE & REPLY	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
AFTER 22 X 1450					
SUMRISE 06555		SUNSET 1804	D-22	Auth.	Attached
				Leave	TAD
				Other	On Board

DEPARTMENT OF TRANSPORTATION U. S. COAST GUARD CG-4380B (Rev. 3-67)				LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET												
VESSEL NAME				DAY		DATE		ZONE DESTINATION								
USCGC VIGOROUS WMEC-627				FRIDAY		27 MAR 67		+5 ROME								
I. WEATHER OBSERVATIONS																
TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	10	1	1000	20	10	SET	29.96	75	68	3	CU	73	090	3	090	2
02	11	0	1000	19	10	SET	29.94	75	68	3	CU	73	090	3	090	2
03	11	1	1000	18	10	SET	29.93	75	68	3	CU	073	090	3	090	2
04	6	5	097	16	10	SET	29.93	75	68	3	CU	73	100	2	100	3
05	10	5	093	13	10	SET	29.92	75	68	3	CU	72	100	2	100	3
06	10	5	070	19	10	SET	29.91	75	70	2	CU	72	110	2	110	3
07	10	5	110	21	10	SET	29.91	76	69	1	CU	72	100	2	110	3
08	6	2	120	11	10	SET	29.92	79	71	1	CU	72	100	1	090	3
09	4	9	120	13	10	SET	29.91	81	72	1	CU	74	080	1	060	3
10	7	2	085	9	10	SET	29.93	81	72	1	CU	73	080	1	070	3
11	14	7	098	10	10	SET	29.92	82	71	1	CU	74	080	1	070	3
12	12	8	090	18	10	SET	29.93	81	73	2	CU	74	070	1	080	3
13	09	0	090	18	10	SET	29.94	80	73	1	CU	74	090	1	080	3
14	3	4	010	17	10	CLR	29.93	78	71	0	-	73	090	1	080	3
15	1	8	085	21	10	CLR	29.91	78	71	0	-	74	085	1	080	3
16	0	5	090	17	10	CLR	29.90	78	71	0	-	74	100	1	110	3
17	0	5	090	15	10	CLR	29.89	77	70	0	-	74	100	1	110	3
18	4	6	082	22	10	SET	29.91	76	70	2	CU	73	100	1	110	3
19	5	0	075	21	10	SET	29.91	77	70	2	CU	73	070	1	090	3
20	5	0	087	30	10	SET	29.93	77	71	2	CU	74	090	2	080	3
21	4	9	090	25	10	SET	29.95	77	70	1	CU	74	120	2	080	3
22	3	4	074	26	10	SET	29.95	77	70	1	CU	74	100	2	080	3
23	5	7	070	26	10	SET	29.93	77	70	1	CU	74	100	2	080	3
24	5	5	070	29	10	CLR	29.91	77	70	0	-	74	070	2	080	3
TOT	177	3														
II. OPERATIONAL SUMMARY																
STATUS AT 0001							CHECK LIST				TIME		INITIALS			
MATERIAL CONDITION							1. Held quarters.				1230		Bef			
READINESS CONDITION							2. Chronometer(s) wound.				1100		RAV			
OPERATIONAL STATUS							3. Held evening reports.				1945		CRC			
MISSION							4. Magazines inspected.				1100		CRC			
							4a. Maximum temperature:				4b. Minimum temperature:					
							80°F				70°F					
MACHINERY CONDITION AND DISCREPANCIES							DRILLS AND TRAINING									
IAW MACHINERY LOGS.							Began		Ended		Type					
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES																
AN/US-23 KMR																
KRC-9																

DEPARTMENT OF TRANSPORTATION U. S. COAST GUARD CG-4380B (Rev. 2-67)		LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET														
VESSEL INFORMATION					DAY		DATE		ZONE/DESTINATION							
USCGC VIGOROUS WMEC 627					SATURDAY		28 MAR 87		+5 ROMEO							
1. WEATHER OBSERVATIONS																
TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	5	5	090	10	10	CLR	29.89	77	74	0	-	74	090	1	090	2
02	5	4	140	11	14	CLR	29.86	77	70	0	-	74	140	1	-	-
03	5	3	140	11	14	CLR	29.86	77	70	0	-	74	140	1	-	-
04	5	6	172	07	10	SC	29.90	77	70	1	Cu	74	-	-	100	1
05	5	7	172	07	10	SC	29.91	77	72	1	Cu	74	-	-	100	1
06	5	7	210	10	10	SC	29.92	77	72	1	Cu	73	-	-	110	1
07	4	7	225	08	10	SC	29.94	80	74	1	Cu	73	-	-	080	1
08	5	9	227	08	10	SC	29.97	85	75	2	Cu	74	74	-	060	1
09	5	7	224	07	10	SC	29.98	90	77	2	Cu	74	-	-	030	1
10	6	2	210	06	10	SC	30.00	93	78	1	Cu	74	-	-	000	1
11	5	0	170	03	10	SC	29.98	91	78	1	Cu	74	-	-	000	1
12	5	5	090	05	10	SC	29.96	86	78	1	Cu	74	030	1	-	-
13	4	0	140	4	10	SC	29.94	86	77	1	Cu	74	100	1	-	-
14	1	3	140	6	10	SC	29.92	90	79	1	Cu	73	100	1	-	-
15	1	4	140	6	10	CLR	29.90	91	79	0	-	74	180	1	-	-
16	7	2	145	7	10	CLR	29.88	86	77	0	-	74	180	1	-	-
17	10	1	130	3	10	CLR	29.88	87	77	0	-	74	180	1	-	-
18	15	0	000	14	10	CLR	29.88	81	71	0	-	74	350	1	-	-
19	15	0	072	19	10	CLR	29.90	79	73	0	-	73	350	1	350	1
20	14	6	080	30	10	CLR	29.92	78	72	0	-	75	350	1	000	3
21	8	2	078	24	10	CLR	29.95	77	72	0	-	75	100	2	000	3
22	11	0	080	17	10	CLR	29.95	77	72	0	-	74	090	2	000	3
23	11	3	084	27	10	SC	29.93	77	72	1	Cu	74	080	2	000	3
24	4	2	080	23	10	SC	29.92	77	72	1	Cu	74	030	2	000	3
TOT	185	0														
11. OPERATIONAL SUMMARY																
STATUS AT 0001							CHECK LIST				TIME		INITIALS			
MATERIAL CONDITION							1. Held quarters.				1230		RCE			
READINESS CONDITION							2. Chronometer(s) wound.				1100		PAW			
OPERATIONAL STATUS							3. Held evening reports.				2030		CRC			
MISSION							4. Magazines inspected.				0923		RCE			
							4a. Maximum temperature:				83°F		4b. Minimum temperature:			
													67°F			
MACHINERY CONDITION AND DISCREPANCIES							DRILLS AND TRAINING									
1AW MACHINERY LOSS.							Began		Ended		Type					
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES																
7																
WRE-9 4HR																
AN/WRE-23 4HR																
SUNRISE 0552							D-24									



LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL STATION

USCGC VIGOROUS WMEC 627

DAY

Monday

DATE

30 Mar 87

ZONE DESTINATION

+5 Romec

I. WEATHER OBSERVATIONS

TIME	MILES	TENS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	14	3	078	20	10	ScT	29.86	77	72	2	Cu	73	090	42	090	3
02	14	9	090	26	10	ScT	29.85	78	73	3	Cu	73	090	2	120	3
03	12	0	085	22	10	ScT	29.84	78	72	3	Cu	73	100	2	120	3
04	14	9	050	24	10	ScT	29.84	77	73	3	Cu	74	080	1	100	3
05	15	0	058	22	10	ScT	29.86	78	73	4	Cu	74	060	1	080	3
06	13	2	067	22	10	BKN	29.87	77	72	6	Cu	74	050	1	080	3
07	15	2	055	21	10	BKN	29.87	79	74	7	Cu	74	050	1	080	3
08	14	9	070	23	10	BKN	29.86	80	74	6	Cu	74	060	1	080	3
09	13	7	100	22	10	ScT	29.86	80	73	4	Cu	74	100	1	090	2
10																
11																
12																
13																
14																
15																
16	MOORED	157	05	10	10	ScT	29.84	83	79	4	Cu	-	-	-	-	-
17																
18																
19																
20	U/W	CALM			10	ScT	29.88	80	74	3	Cu	-	-	-	-	-
21	10	8	270	15	10	CLR	29.89	79	74	0	-	74	100	2	090	2
22	14	8	315	10	10	CLR	29.90	79	74	0	-	74	300	2	090	2
23	15	0	060	12	10	ScT	29.90	79	74	1	Cu	73	060	2	090	2
24	15	0	060	10	10	ScT	29.89	78	73	2	Cu	73	060	1	060	2
TOT	183	7														

II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YOKE	1. Held quarters.		1930	M2H
READINESS CONDITION	TV	2. Chronometer(s) wound.		1130	B2F
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		2100	PAW
MISSION	TA HM10/LE	4. Magazines inspected.		1038	M2H
		4a. Maximum temperature:		81	4b. Minimum temperature:
					69
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
1AW MACHINERY LOGS		Began	Ended	Type	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
AN/US-23 XAF					
WRC-9 WAF					
		D-26	Auth.	Attached	Leave
				TAD	Other
SUNRISE 0555					On Board
SUNSET					



DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4380B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL NAME

USCGC VIGOROUS (WMEC 617)

DAY

TUESDAY

DATE

31 MAR 87

ZONE DESTINATION

+ S RENEW

## I. WEATHER OBSERVATIONS

TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB				DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	15	2	090	11	10	SCT	29.88	78	73	2	CU	73	060	1	060	2
02	15	1	105	12	10	SCT	29.86	78	74	1	CU	73	050	1	060	2
03	15	6	098	22	10	SCT	29.84	78	75	2	CU	73	040	1	050	2
04	15	5	135	14	10	SCT	29.86	78	74	1	CU	73	040	1	080	2
05	16	4	130	15	10	BKN	29.88	77	74	6	CU	73	100	1	090	2
06	10	7	125	14	10	BKN	29.89	77	74	6	CU	73	110	1	080	2
07	14	8	120	12	10	SCT	29.90	80	75	4	CU	73	110	1	070	2
08	14	9	130	14	10	SCT	29.92	80	75	5	CU	73	110	1	070	2
09	10	1	120	14	10	SCT	29.93	84	75	3	CU	74	110	1	090	2
10	14	8	110	10	10	SCT	29.93	86	77	2	CU	74	100	1	090	2
11	14	8	100	9	10	CLR	29.93	89	79	0	-	74	090	1	090	2
12	15	0	100	8	10	CLR	29.91	89	79	0	-	74	120	1	130	130
13	14	9	140	10	10	CLR	29.89	89	78	0	-	74	110	1	120	120
14	15	0	160	11	10	CLR	29.87	88	78	0	-	74	170	1	170	1
15	9	5	160	11	10	SCT	29.86	83	77	1	CU	73	160	1	190	1
16	8	0	150	11	10	SCT	29.86	83	77	1	CU	73	160	1	190	1
17	15	1	160	10	10	SCT	29.86	83	77	1	CU	73	170	1	085	2
18	15	2	175	10	10	SCT	29.87	79	75	2	CU/CI	70	170	1	085	2
19	17	9	178	5	10	SCT	29.90	77	74	4	CU	68	180	.5	085	1
20	14	8	178	5	10	SCT	29.92	77	74	6	CU	68	180	.5	080	1
21	15	2	200	5	10	SCT	29.94	75	72	10	NS	70	180	1	090	2
22	14	5	345	20	8	OVC	29.93	74	70	10	NS	70	180	1	090	3
23	15	5	340	29	10	SCT	29.92	72	68	7	CU	70	180	1	090	3
24	15	0	330	27	10	OVC	29.93	70	66	10	CU	70	350	2	350	3
TOT	333	5														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YOKE	1. Held quarters.		1230	BCF
READINESS CONDITION	IV	2. Chronometer(s) wound.		0850	PAW
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	PAW
MISSION	LE/HM10	4. Magazines inspected.		0834	PAW
		4a. Maximum temperature:	87°F	4b. Minimum temperature:	
				67°F	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
1AW MACHINERY LOGS		Began	Ended	Type	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
AN/ARC-23 XMR					
WRC-7 WRF					
SCAN-18					
SUNRISE 0654		SUNSET 1812			
DRAFT: 700		APT			
		D-27	Auth.	Attached	Leave
				TAD	Other
					On Board

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4340B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL DESIGNATION

DAY

DATE

ZONE DESTINATION

USCGC VIGOROUS (WMEC 627)

WEDNESDAY 01 APR 87

+ S Route

## I. WEATHER OBSERVATIONS

TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbol)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	15	0	340	26	10	OVC	29.94	70	65	10	Cu	73 <sup>10</sup>	320	3	330	3
02	14 <sup>12</sup>	5	335	26	10	OVC	29.93	69	62	10	Cu	68	320	3	330	3
03	13	1	325	25	10	OVC	29.93	69	62	10	Cu	68	320	3	320	3
04	14	0	340	24	10	BKN	29.94	68	59	8	Cu	68	315	1	315	5
05	13	8	355	13	10	BKN	29.95	67	60	8	Cu	68	315	1	315	5
06	13	9	340	13	10	BKN	29.96	66	58	7	Cu	68	330	1	330	5
07	13	5	355	24	10	BKN	30.01	66	57	7	Cu	68	350	1	350	7
08	14	8	345	34	10	BKN	30.02	67	58	7	Cu	69	350	3	350	6
09	15	0	345	34	10	BKN	30.02	69	58	6	Cu	69	350	3	340	6
10	15	0	340	27	10	BKN	30.02	69	58	5	Cu	67	350	3	340	6
11	15	0	330	23	10	SET	30.02	70	58	3	Cu	64	350	3	340	6
12	14	1	000	21	10	BKN	30.01	70	58	6	Cu	64	350	3	340	5
13	12	2	325	17	10	BKN	30.01	69	58	6	Cu	64	350	3	350	4
14	8	6	380	12	10	SET	30.01	69	58	4	Cu	63	380	3	350	4
15	14	4	345	15	10	OVC	29.99	65	57	10	Cu	63	340	2	340	6
16	15	0	000	14	10	OVC	30.00	65	57	9	Cu	68	345	2	345	5
17	15	6	000	11	10	BKN	30.01	60	56	7	Cu	68	345	1	345	5
18	15	0	020	6	10	BKN	30.01	64	55	6	Cu	68	345	1	345	5
19	14	6	040	11	10	BKN	30.03	63	54	7	Cu	67	330	1	345	3
20	14	2	000	11	10	SET	30.05	63	54	3	Cu	68	340	1	340	3
21	14	6	000	15	10	BKN	30.07	63	54	7	Cu	68	340	1	340	3
22	15	0	000	15	10	BKN	30.07	63	55	9	Cu	68	340	1	340	3
23	14	5	000	16	10	SET	30.09	61	54	3	Cu	65	345	1	345	3
24	15	0	000	14	10	CLR	30.09	60	52	0	—	64				
TOT	324	5														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST	TIME	INITIALS
MATERIAL CONDITION	YOKE	1. Held quarters.	1230	BEF
READINESS CONDITION	IV	2. Chronometer(s) wound.	1030	PAW
OPERATIONAL STATUS	ALPHA	3. Held evening reports.	1945	BEF
MISSION	HM10/LE	4. Magazines inspected.	0851	PAW
		4a. Maximum temperature: 85°F	4b. Minimum temperature: 65°F	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING		
IAW MACHINERY LOGS		Began	Ended	Type
		1245	1400	SEA GUARD
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES				
AN/445-22 XDR				
WAC-9 XDR				
AN/SPN-18				
		D-28	Auth.	Attached
		Leave	TAD	Other
		On Board		
SUNRISE	0551	SUNSET	1819	

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4380B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL ~~44130~~

USCGC VIGOROUS (WMEC 627)

DAY

THURSDAY

DATE

02 APR 87

ZONE DESTINATION

+5 ROMEO

## I. WEATHER OBSERVATIONS

TIME	MILES	TERMS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	14	8	030	08	10	SCT	30.08	59	52	2	CU	63	040	1	350	3
02	14	9	028	08	10	SCT	30.08	59	51	4	CU	65	020	1	350	3
03	15	2	070	04	10	BKN	30.07	58	50	6	CU	64	040	1	000	2
04	15	1	045	05	10	BKN	30.08	58	50	6	CU	64	040	1	000	3
05	15	4	045	06	10	BKN	30.10	58	50	6	CU	64	040	1	000	3
06	16	0	040	45	10	OVC	30.12	57	49	10	CU	63	040	1	010	2
07	15	1	024	5	10	BKN	30.13	57	49	9	CU	65	020	1	010	2
08	14	9	207	5	10	BKN	30.15	58	50	9	CU	64	-	-	320	2
09	14	9	190	6	10	BKN	30.16	59	51	9	CU	64	-	-	320	2
10	14	5	190	6	10	BKN	30.17	59	51	9	CU	64	-	-	340	2
11	14	5	220	8	10	BKN	30.16	63	53	8	CU	64	-	-	310	2
12	14	3	220	10	10	BKN	30.14	65	55	9	CU	64	220	1	050	2
13	15	9	230	13	10	BKN	30.12	65	55	8	CU	64	220	1	055	2
14	16	1	230	08	10	BKN	30.10	65	55	8	CU	64	215	1	035	2
15	16	9	220	14	10	BKN	30.08	65	55	8	CU	64	220	1	035	2
16	16	3	205	14	10	BKN	30.07	65	55	7	CU	65	210	1	035	2
17	16	5	205	11	10	BKN	30.05	64	55	7	CU	64	210	1	040	2
18	17	0	225	17	10	BKN	30.04	62	53	7	CU	64	230	1	020	2
19	16	8	220	16	10	SCT	30.04	61	53	5	CU	64	230	2	020	2
20	15	0	220	23	10	SCT	30.05	61	54	3	CU	64	230	2	230	2
21	14	6	216	20	10	SCT	30.05	62	54	3	CU	64	230	2	230	2
22	14	9	215	20	10	SCT	30.05	62	54	3	CU	64	230	1	230	2
23	13	2	228	18	10	SCT	30.06	62	55	3	CU	64	190	1	140	2
24	13	1	225	10	10	SCT	30.06	55	51	2	CU	46			140	2
TOT	365	5														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	Yoke	1. Held quarters.		1225	RC
READINESS CONDITION	IV	2. Chronometer(s) wound.		1120	BEF
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	BEF
MISSION	LE	4. Magazines inspected.		0827	BEF
		4a. Maximum temperature:	73°	4b. Minimum temperature:	
				56°	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
IAW MACHINERY LOGS		Began	Ended	Type	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
M/HRT-23 XARS					
WRC-9 UHF					
SRN-18					
SUNRISE 0549		D-29		Auth.	On Board
SUNSET 1823				Attached	10
				Leave	0
				TAD	1
				Other	0

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4380B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL ~~STATION~~

USCGC VIGOROUS (WMEC 627)

DAY

FRIDAY

DATE

3 APR 87

ZONE DESTINATION

+5 RUMBLE

## I. WEATHER OBSERVATIONS

TIME	MILES	TENS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	13	0	225	09	10	SCT	30.06	52	50	4	CU	41	200	1	140	1
02	12	7	105	05	10	SCT	30.06	50	48	3	CU	41	200	1	140	1
03	12	5	202	09	10	SCT	30.06	49	47	2	CU	41	200	1	140	1
04	12	3	230	19	10	SCT	30.04	48	45	1	CU	41	200	1	140	1
05	11	8	010	22	10	SCT	30.02	47	44	1	CU	41	020	2	030	3
06	12	1	025	16	10	SCT	30.05	45	42	1	CU	41	030	2	030	2
07	14	8	020	17	10	CLR	30.06	45	42	0	-	41	020	2	350	1
08	14	9	062	18	10	BKN	30.08	46	42	9	AC	40	062	1	350	1
09	9	1														
10	MOORED															
11																
12	MOORED		060	17	08	OVC	30.03	49	50	NS	NS	-	-	-	-	-
13																
14																
15																
16	MOORED		065	25	05	OVC	29.94	49	46	10	NS	-	-	-	-	-
17																
18																
19																
20	MOORED		065	25	05	OVC	29.80	49	48	10	NS	-	-	-	-	-
21																
22																
23																
24	MOORED		090	08	08	OVC	29.76	53	52	10	NS	-	-	-	-	-
TOT	113	2														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YOKE	1. Held quarters.		1030	002
READINESS CONDITION	IV	2. Chronometer(s) wound.	OK	1030	0
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	MT
MISSION	LE	4. Magazines inspected.		1030	002
		4a. Maximum temperature:	71°	4b. Minimum temperature:	42°
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
(AW MACHINERY LOGS)		Began	Ended	Type	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
SUNRISE 0547		SUNSET 1830	D-30	Auth.	Attached
				Leave	TAD
				Other	On Board

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4350B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL ~~USCGC~~

USCGC VIGOROUS (WMEC-627)

DAY

T SAT

DATE

04 APR 1987

ZONE DESTINATION

T S ROMEO

## I. WEATHER OBSERVATIONS

TIME	MILES	TERMS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01																
02																
03																
04	MOORED		090	08	04	OVC/R	29.55	53	51	10	EMS	-	-	-	-	-
05																
06																
07																
08	MOOR ED		220	08	10	BKN	29.53	47	47	9	NS					
09																
10	U/W															
11	3	8	200	23	10	OVC	29.54	49	44	10	CU	-	200	2	-	-
12	9	3	220	21	10	BK	29.56	49	44	9	CU	-	190	2	-	-
13	13	5	228	22	10	OVC	29.59	46	42	10	CU	-	228	2	200	2
14	14	9	210	24	10	OVC	29.62	46	42	10	CU	40	210	2	170	2
15	15	5	215	23	10	BKN	29.62	48	42	9	CU	-	-	-	180	3
16	15	1	215	21	10	BKN	29.64	46	42	9	CU	-	250	1	150	3
17	15	0	215	22	10	BKN	29.67	46	42	9	CU	35	230	1	181	5
18	10/13	4	220	27	10	BKN	29.69	45	41	9	CU	-	220	2	170	4
19	10	6	222	21	10	BKN	29.70	45	41	8	CU	-	210	2	160	3
20	10	8	218	17	10	SC	29.73	45	40	3	AC	-	218	2	180	4
21	11	4	218	17	10	BKN	29.75	45	41	6	AC	-	218	2	180	4
22	10	7	218	15	10	CLR	29.75	44	40	0	-	38	218	2	180	5
23	10	9	203	17	10	CLR	29.76	44	40	0	-	-	203	2	180	5
24	10	8	160	10	10	SC	29.76	44	41	4	CU	35	160	2	180	5
25	164	9														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YOKE	1. Held quarters.		0915	WJS
READINESS CONDITION	II	2. Chronometer(s) wound.		1120	BCF
OPERATIONAL STATUS	BRAVO - 6	3. Held evening reports.		1945	BCF
MISSION		4. Magazines inspected.		1252	an
		4a. Maximum temperature:	71	4b. Minimum temperature:	42
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
IAW MACHINE MACHINERY LOGS		Began	Ended	Type	
		0925	0940	ABANDON SHIP	
		1320	1357	GE-GALLEY FIRE	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
WJ-23 XMR					
WJC-9					
SEN-18					
SUNRISE	0545	SUNSET	1827	D-31	
		Auth.	Attached	Leave	TAD
				Other	On Board

LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL STATION DAY DATE ZONE DESTINATION  
USCG VIGOROUS WMEC 627 SUNDAY 5 APR 87 +4 QUEBEC

I. WEATHER OBSERVATIONS

TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIREC- TION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIREC- TION (True)	HEIGHT (Feet)	DIREC- TION (True)	HEIGHT (Feet)
01	10	5	130	13	10	BKN	29.77	44	41	6	CI	-	150	1	170	3
02	10	8	130	12	10	SCT	29.77	44	41	4	CI	-	130	1	170	3
03	ADVANCED CLOCKS LHR TO +4 QUEBEC															
04	10	2	130	14	10	SCT	29.77	43	41	4	CI	35	150	1	170	3
05	10	6	138	11	10	SCT	29.78	44	42	3	CI	35	130	1	170	3
06	9	2	130	09	10	OVC	29.81	44	42	10	CU	-	130	1	190	4
07	9	8	153	08	10	OVC	29.82	44	42	10	CU	36	130	1	170	5
08	9	4	130	9	10	SCT	29.82	44	42	5	AC/CI	35	130	1	170	5
09	13	4	123	8	10	SCT	29.82	45	42	3	AC/CI	35	123	1	170	6
10	13	2	153	5	10	BKN	29.82	46	43	9	AC/CI	35	-	-	130	6
11	14	4	060	5	10	BKN	29.83	46	43	9	AC/CI	35	-	-	120	7
12	15	6	180	6	10	BKN	29.82	48	45	8	CI	35	-	-	140	4
13	14	3	030	4	5	OVC	29.81	47	45	10	CI	34	040	1	130	4
14	15	0	024	22	8	OVC	29.78	48	46	10	CI	34	024	2	120	4
15	14	6	020	24	7	BKN	29.76	47	45	7	CI	34	020	2	120	5
16	14	5	015	21	8	SCT	29.76	47	44	2	SI	34	020	3	010	2
17	13	5	035	16	7	OVC	29.75	45	43	10	ST	34	020	2	010	3
18	11	0	313	08	0.1	OVC/F	29.75	43	42	10	ST	34	000	2	320	3
19	5	5	010	13	0.1	OVC/F	29.75	43	42	10	ST	34	020	1	220	3
20	4	7	057	17	0.2	OVC/F	29.75	42	37	10	ST	34	057	1	100	5
21	8	8	030	13	0.1	OVC/F	29.76	42	41	10	ST	34	030	1	110	5
22	7	0	020	12	0.1	OVC/F	29.76	42	42	10	ST	34	020	1	110	4
23	6	7	010	9	0.1	OVC/F	29.75	43	42	10	ST	34	010	1	110	4
24	7	6	010	7	0.1	FIR	29.74	42	42	0	-	34	010	1	110	3
25	4															

II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YOK	1. Held quarters.		1600	RF
READINESS CONDITION	IV	2. Chronometer(s) wound.		1023	RF
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	RF
MISSION	FISHERIES	4. Magazines inspected.		0920	RF
		4a. Maximum temperature:	67° F	4b. Minimum temperature:	
				42° F	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
TAW MACHINERY LOGS		Began	Ended	Type	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
AN/URT-33 XDR					
URC-9					
SON-18					
		D-32	Auth.	Attached	Leave
					TAD
					Other
					On Board
SUNRISE 0634		SUNSET 1822 1913			

LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL ~~DESIGNATION~~

USCGC *Vigorous* WMEC-627

DAY

*Monday*

DATE

*6 APR 87*

ZONE DESTINATION

*+4 GULF*

I. WEATHER OBSERVATIONS

TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	6	6	010	11	0.1	F/R	29.72	42	42	0	-	34	010	1	110	3
02	7	0	015	10	0.1	F	29.68	41	41	0	-	33	010	1	110	2
03	7	3	010	10	0.1	F	29.66	41	41	0	-	36	010	1	110	2
04	8	0	003	20	0.1	F/OVC	29.64	43	42	10	ST	35	030	1	110	2
05	8	0	103	21	0.1	F/OVC	29.64	43	42	10	ST	35	050	1	080	2
06	7	4	070	14	0.1	F/OVC	29.65	42	42	10	ST	35	070	1	060	2
07	9	5	130	3	5	F/OVC	29.68	42	41	10	SC	35	060	1	070	2
08	12	5	LIGHT & VARIABLE		5	R/OVC	29.69	42	41	10	SC	35	-	-	050	3
09	14	7	037	17	7	R/OVC	29.65	42	41	10	SC	35	037	1	060	2
10	14	3	067	7	10	OVC	29.67	43	42	10	SC	35	067	1	055	2
11	9	7	030	13	10	OVC	29.68	44	43	10	SC	35	030	1	085	2
12	3	0	040	10	7	OVC	29.68	44	43	10	SC	35	040	1	-	-
13	4	0	030	7	0.1	F/R	29.70	43	43	0	-	34	030	1	-	-
14	7	8	030	7	0.1	F/R	29.68	44	43	0	-	35	030	1	-	-
15	6	3	200	11	15	F/R	29.68	43	42	0	-	36	200	1	140	1
16	1	5	200	11	6	BKN	29.67	42	41	6	SC	36	200	1	150	2
17	2	1	210	12	8	OVC	29.67	42	41	10	SC	36	210	1	190	2
18	8	9	210	11	15	F/R	29.67	42	41	0	-	35	200	1	180	2
19	8	6	186	14	4	OVC	29.65	41	40	10	ST	35	180	1	180	1
20	9	0	260	16	2	OVC/F	29.64	40	39	10	ST	34	260	1	160	3
21	11	5	277	17	3	OVC/F	29.65	40	39	10	ST	34	277	1	140	3
22	14	2	270	16	8	OVC	29.64	40	39	10	ST	34	270	1	220	3
23	14	0	255	19	10	OVC	29.63	41	39	10	ST	34	255	2	240	4
24	11	0	270	18	10	SCT	29.58	41	39	2	CU	36	270	2	240	3
TOT	206	9														

II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YOKE	1. Held quarters.		1230	BF
READINESS CONDITION	IV	2. Chronometer(s) wound.		1108	Qu
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	Qu
MISSION	FISHERIES	4. Magazines inspected.		0842	Qu
		4a. Maximum temperature: 64°F		4b. Minimum temperature: 40°F	
MACHINERY CONDITION AND DISCREPANCIES		DRILL AND TRAINING			
LAW MACHINERY LOGS		Began	Ended	Type	
				TOWER	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
A/HUT-23 work					
URC-9 work					
SEN-18					
SUNRISE 0622	SUNSET 1915	D-33	Auth.	Attached	Leave
				TAD	Other
					On Board
DRAFT: PDB		APT			

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4340B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL NAME: USCGC VIGOROUS WMEC-627 DAY: TUESDAY DATE: 7 APR 87 ZONE/DESTINATION: +4 QUEBEC

## I. WEATHER OBSERVATIONS

TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbol)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	10	6	260	16	10	CLR	29.58	41	39	0	—	36	260	2	240	3
02	11	0	258	13	10	CLR	29.57	41	39	4	CU	34	270	2	245	3
03	10	6	254	16	10	OVC	29.57	41	39	10	STR	34	255	2	245	3
04	11	0	257	14	10	BKN	29.56	40	39	8	Sc	34	250	1	230	2
05	11	0	260	15	10	OVC	29.56	40	39	10	Sc	34	250	1	230	2
06	10	1	258	14	10	OVC	29.55	40	39	10	Sc	34	260	1	230	2
07	14	4	255	12	10	ScT	29.55	40	39	4	Sc	34	260	1	230	2
08	13	2	225	15	10	ScT	29.56	41	40	3	AC	34	225	1	255	3
09	3	8	230	14	10	BKN	29.55	41	40	7	AC	34	230	2	060	3
10	3	3	230	10	10	ScT	29.55	42	40	4	AC	37	230	2	070	3
11	8	4	225	19	10	ScT	29.53	42	40	3	AC	37	225	2	060	3
12	13	8	160	11	9	ScT/H	29.53	47	44	4	AC	36	160	1	070	3
13	11	1	160	8	10	ScT/H	29.52	47	44	4	AC	36	170	1	210	3
14	7	2	165	9	10	ScT/H	29.50	47	44	4	AC	36	140	1	090	3
15	10	2	160	9	8	ScT/H	29.50	47	44	3	CI	35	160	1	050	3
16	5	6	185	13	8	BKN/H	29.49	45	42	9	AC	36	185	1	085	4
17	3	3	170	14	9	OVC	29.48	42	41	10	AC	36	170	1	220	4
18	2	6	160	13	1	OVC/R	29.48	41	41	10	SC	34	160	2	230	4
19	2	0	170	10	4.5	OVC/R	29.48	41	40	10	SC	36	170	2	230	4
20	3	0	230	13	5.0	OVC/R	29.47	41	41	10	SC	34	230	1	250	3
21	11	0	248	17	5.0	OVC/H	29.48	41	41	10	SC	34	248	1	250	3
22	11	0	269	20	10.0	OVC	29.53	40	39	10	SC	34	269	1	250	3
23	10	0	264	16	10.0	OVC	29.56	40	39	10	SC	34	264	1	250	3
24	10	0	260	14	10	BKN	29.53	40	39	9	Sc	34	260	1	250	3
TOT	208	4														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YOKI	1. Held quarters.		1225	PAW
READINESS CONDITION	II	2. Chronometer(s) wound.		1114	QW
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	PAW
MISSION	FISHERIES	4. Magazines inspected.		1003	QW
		4a. Maximum temperature: 63°F		4b. Minimum temperature: 43°F	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
IAW MACHINERY LOGS		Began	Ended	Type	
		1230	1630	G.O. COMBAT	
		1900	1950	PYRO TRAINING	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
AN/WES-22 KMPR					
WES-9 KHF					
SQN-18					
SUNRISE 0609		SUNSET 1907		D-34	
		Auth.	Attached	Leave	TAD
					Other
					On Board



DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4300B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL STATION

USCGC VIGORAS WMEC (627)

DAY

Wednesday

DATE

2 APR 67

ZONE DESTINATION

14 GULF OF C

## I. WEATHER OBSERVATIONS

TIME	MILES	TENS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	10	0	260	10	10	BKN	29.52	41	40	9	Sc	34	260	1	250	3
02	9	4	255	12	10	BKN	29.51	41	40	9	Sc	37	250	1	250	3
03	9	7	267	12	10	OVC	29.50	42	40	10	Sc	37	250	1	250	3
04	9	6	233	20	10	OVC	29.48	40	37	10	Sc/As	34	233	2	250	3
05	9	7	226	6	10	OVC	29.48	40	38	10	Sc	34	226	1	250	3
06	9	8	169	3	10	OVC	29.49	40	39	10	Sc	34	-	-	250	4
07	9	4	150	5	3	OVC/F	29.50	40	40	10	Sc	34	-	-	240	4
08	4	2	160	5	3	FR	29.50	40	40	0	-	34	160	5	190	3
09	2	1	240	4	1	FR	29.51	42	41	10	Sc	35	-	-	190	3
10	1	9	320	5	5	OVC	29.51	40	39	10	Sc	36	320	1	190	3
11	2	4	340	10	3	OVC	29.51	40	39	10	Sc	36	340	1	190	3
12	5	5	355	12	3	OVC	29.54	40	39	10	Sc	36	250	1	080	3
13	4	0	010	15	5	OVC	29.53	39	39	10	Sc	36	350	1	050	3
14	4	1	010	15	5	OVC	29.53	39	39	10	ST	35	000	1	350	3
15	3	8	015	16	6	OVC	29.54	39	39	10	ST	35	330	1	340	3
16	2	0	000	16	8	OVC	29.55	39	37	10	Sc	35	000	1	040	2
17	7	1	340	20	8	OVC	29.55	40	39	10	Sc	35	340	2	330	3
18	13	2	322	11	10	OVC	29.57	40	39	10	Sc	35	322	2	330	4
19	2	6	340	11	10	BKN	29.54	39	37	9	Sc	36	340	2	005	4
20	3	5	240	12	8	OVC	29.61	39	37	10	Sc	36	240	2	005	4
21	9	4	310	14	8	OVC	29.62	39	37	10	Sc	36	260	2	005	4
22	10	3	295	14	8	OVC	29.62	39	37	10	Sc	36	260	2	005	4
23	10	0	295	14	8	OVC	29.62	39	37	10	Sc	36	250	2	350	4
24	10	5	305	14	7	OVC/L	29.59	39	38	10	Ns	36	330	2	390	3
TOT	164	2														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	Yoke	1. Held quarters.		1300	12ef
READINESS CONDITION	IV	2. Chronometer(s) wound.		0925	PAW
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	PAW
MISSION	FISHERIES	4. Magazines inspected.		0944	PAW
		4a. Maximum temperature:	61°F	4b. Minimum temperature:	
				53°F	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
PAW MACHINERY LOGS		Began	Ended	Type	
		1331	1358	P-250 TRAINING	
		1813	1923	50 GUNNEX	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
AM/URG-23 XATE					
URG-9 XAF					
SEN-18					
SUNRISE	0559	SUNSET	1902		
		D-35	Auth.	Attached	Leave
			TAD	Other	On Board

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4300B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL **STATION**

DAY

DATE

ZONE DESTINATION

USCGC **VIGOROUS (WMEC 627)**

**Thursday**

**9 APR 67**

**+ 4 CLEVELAND**

## I. WEATHER OBSERVATIONS

TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	9	5	240	7	7	OVC/L	29.57	44.39	38	10	NS	35	240	L	240	3
02	9	2	320	18	8	OVC	29.55	38	38	10	SC	35	300	L	300	3
03	9	3	310	20	10	OVC	29.56	38	37	10	SC	35	300	L	300	3
04	10	4	325	18	10	BKN	29.55	38	36	6	SC	35	325	2	300	3
05	9	2	320	20	10	OVC/2	29.59	37	35	10	SC	35	320	2	310	4
06	9	3	300	17	10	OVC	29.61	38	36	10	SC	36	300	2	310	4
07	9	3	320	16	9	BKN	29.63	37	35	9	SC	35	320	2	300	4
08	10	4	284	19	10	BKN	29.63	40	39	9	CU	35	325	2	300	2
09	3	L	292	17	10	BKN	29.63	42	40	8	CU	35	300	1	300	2
10	L	5	295	12	10	BKN	29.64	42	40	6	AC	35	290	1	300	3
11	12	25	292	15	10	BKN	29.64	43	41	7	CU	35	290	1	300	3
12	2	7	327	19	10	BKN	29.64	45	41	9	CU	35	290	1	300	3
13	2	3	325	20	10	BKN	29.62	45	41	9	CU	35	290	L	300	3
14	1	8	300	17	10	OVC	29.63	43	40	10	SC	34	290	1	300	3
15	4	0	310	15	10	OVC	29.64	41	39	10	SC	35	310	L	320	3
16	0	6	330	16	10	BKN	29.64	40	38	6	SC	35	330	2	330	3
17	3	2	300	13	10	SC	29.64	40	38	3	CU/AC	35	300	2	305	3
18	14	4	280	6	10	SC	29.64	42	39	3	CU/CL	35	280	1	330	2
19	0	9	300	11	10	SC	29.67	40	37	5	SC	35	300	1	300	2
20	L	9	305	10	10	OVC	29.67	40	37	10	SC	35	310	1	320	2
21	10	0	304	8	10	OVC	29.69	40	38	10	SC	35	310	1	320	2
22	9	8	292	8	10	OVC	29.68	39	37	10	SC	35	310	1	320	2
23	9	9	289	10	10	OVC	29.68	39	37	10	SC	35	310	1	320	2
24	7	8	162	2	10	OVC	29.69	41	39	10	SC	35	280	1	280	2
TOT	152	6	162													

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YONE	1. Held quarters.		1335	BEF
READINESS CONDITION	IV	2. Chronometer(s) wound.		1000	PAW
OPERATIONAL STATUS	Alpha	3. Held evening reports.		1945	PAW
MISSION	DOMESTIC FISHERIES	4. Magazines inspected.		1020	PAW
		4a. Maximum temperature:	61°F	4b. Minimum temperature: 47°F	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
1AW MACHINERY LOGS		Began	Ended	Type	
		1205	1235	BOAT LOWERING TRAINING	
		1340	1355	LECTURE - PROTECTIVE CLOTHING	
		1502	1900	RUBBER DUCKING	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
AN/URC-22 KATR					
URC-9 UHF					
SRN-18					
SUNRISE	0601	SUNSET	1900	D-36	
		Auth.	Attached	Leave	TAD
				Other	On Board

## LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

**VESSEL NAME**

DAY

DATE \_\_\_\_\_

ZONE DESTINATION

USCGC Vigilant (WMEC 621)

FRIDAY

UK Air & i

+4 Guinea

## 1. WEATHER OBSERVATIONS

[illegible]

## 11. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS			
MATERIAL CONDITION	Yoke	1. Held quarters.		1230	Bef			
READINESS CONDITION	IV	2. Chronometer(s) wound.		1345	Bef			
OPERATIONAL STATUS	ALPHA	3. Held evening reports.						
MISSION	DOMESTIC FISHERIES	4. Magazines Inspected.		1054	Pitw			
		4a. Maximum temperature: 66°F		4b. Minimum temperature: 37°F				
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING						
IAW Machinery Log		Began	Ended	Type				
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES								
AN/WRT-23 KXKH								
WRC-9 WHF								
SDN-18								
SUNRISE 0601                      SUNSET		D-37-	Auth.	Attached	Leave	TAD	Other	On Board

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4380B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL NAME

USCGC VIGOROUS (WMEC 627)

DAY

SATURDAY

DATE

11 APR 87

ZONE DESTINATION

+4 QUEBEC

## I. WEATHER OBSERVATIONS

TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	9	9	200	10	10	CLR	29.72	44	43	0	-	35	200	.5	174	1
02	9	9	170	7	10	CLR	29.72	44	42	0	-	35	-	-	190	1
03	9	9	214	5	10	CLR	29.72	44	43	0	-	35	200	.5	190	1
04	9	2	139	3	10	CLR	29.72	45	43	0	-	35	200	.5	200	1
05	9	7	200	2	10	CLR	29.72	44	42	0	-	35	200	.5	-	-
06	8	6	190	3	10	CLR	29.74	45	42	0	-	37	-	-	-	-
07	10	1	CALM	10	10	CLR	29.77	49	45	0	-	37	-	-	-	-
08	MOORED															
09																
10																
11																
12	MOORED		CALM		10	CLR	29.77	55	42	0	-	-	-	-	-	-
13																
14																
15																
16	MOORED		CALM		10	CLR	29.77	68	65	0	-	-	-	-	-	-
17																
18																
19																
20	MOORED		CALM		10	CLR	29.77	63	53	0	-	-	-	-	-	-
21																
22																
23																
24	MOORED		CALM		10	CLR	29.79	55	51	0	-	-	-	-	-	-
TOT	67	3														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	Yoke	1. Held quarters.		1000	PAW
READINESS CONDITION	IV	2. Chronometer(s) wound.		1000	PAW
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1015	PAW
MISSION	DOMESTIC FISHERIES	4. Magazines inspected.		1133	REP
		4a. Maximum temperature:	64 OF	4b. Minimum temperature:	
				51 OF	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
JAW MACHINERY LOGS		Began	Ended	Type	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
M/UFT-23 XMT					
UIC-9 UHF					
SRN-18					
SUNRISE	0611	SUNSET	1920	D-38	
		Auth.	Attached	Leave	TAD
					Other
		On Board			

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4380B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL STATION

USCGC VIGOROUS WAVE-627

DAY

SUNDAY

DATE

12 APR 87

ZONE DESTINATION

+4 CUEEL35C

## I. WEATHER OBSERVATIONS

TIME	MILES	TENTS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01																
02																
03																
04	100	120	224	5	10	CLR	29	52	47	0	-	-	-	-	-	-
05																
06																
07																
08	1100	1100	220	5	10	SLT	29.82	55	52	2	CI	-	-	-	-	-
09																
10																
11	U/W		240	14	10	SLT	29.81	63	55	2	Cu	-	-	-	-	-
12	4	8	240	14	10	SLT	29.81	63	55	2	Cu	-	-	-	-	-
13	7	5	LIGHT & VARIABLE		10	SLT	29.81	64	56	3	Cu	-	055	.5	-	-
14	7	1	LIGHT & VARIABLE		10	SLT	29.80	69	59	4	CU/CI	-	-	-	155	1
15	6	0	100	8	8	SLT/H	29.80	63	56	5	CU/CI	36	-	-	155	1
16	7	2	130	7	10	SLT	29.84	63	56	3	CU	-	140	.5	-	-
17	3	0	090	8	8	BKN	29.81	57	52	8	Cu	-	100	.5	-	-
18	ANCHORED		080	8	10	SLT	29.82	55	53	7	CU	-	140	.5	-	-
19	0	0	020	8	10	BKN	29.84	50	40	9	Cu	-	090	.5	-	-
20	6	5	012	12	10	BKN	29.85	49	47	7	CI	-	090	.5	-	-
21	6	7	040	11	10	BKN	29.85	47	44	10	SL	35	020	.5	-	-
22	2	4	050	19	10	OVC	29.86	44	45	10	SL	-	050	1	050	1
23	3	8	080	14	1	OVC/F	29.88	44	43	10	SL	-	060	1	060	1
24	5	5	080	10	1	OVC/F	29.88	43	43	10	SL	35	080	1	080	2
TOT	60	5														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	Yoke	1. Held quarters.		1600	BeF
READINESS CONDITION	<del>IX</del> V	2. Chronometer(s) wound.		1130	BeF
OPERATIONAL STATUS	B-6	3. Held evening reports.		1945	BeF
MISSION	DOMESTIC FISHERIES	4. Magazines inspected.		1314	BeF
		4a. Maximum temperature:		67	4b. Minimum temperature:
					42
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
IAW MACHINERY LOG		Began	Ended	Type	
		1600	1651	PRECISION ANCHORING	
				✓	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
AN/URF-22 XACTR					
URC-9 UHF					
SDV-18					
SUNRISE	0602	SUNSET	1920	D-39	
		Auth.	Attached	Leave	TAD
					Other
					On Board

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4300B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL USCGC V. GOROUS (WMEC 627)

DAY

DATE

ZONE DESTINATION

MONDAY 15 APR 87

+4 QUEBEC

## I. WEATHER OBSERVATIONS

TIME	MILES	TENS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	3	0	060	17	4	OVC/E	29.87	42	41	10	SC	36	060	1	040	2
02	3	8	065	26	3	OVC/E	29.88	42	41	10	SC	36	065	2	045	4
03	5	6	058	25	5	OVC	29.87	41	40	10	SC	32	058	2	060	5
04	7	6	045	26	6	OVC	29.86	40	39	10	SC	32	045	5	060	2
05	8	9	130	23	4	OVC	29.86	41	40	10	SC	35	040	5	045	5
06	9	5	055	35	2	OVC/R	29.88	41	40	10	SC	35	050	7	045	3
07	8	2	060	28	2	OVC/R	29.89	40	39	10	SC	35	050	8	045	3
08	7	5	038	25	.5	OVC/R	29.88	40	40	10	NS	35	050	4	060	4
09	6	5	050	37	.5	OVC/R	29.83	40	39	10	NS	35	050	3	060	3
10	0	5	150	40	1	OVC/R	29.83	40	40	10	NS	34	040	4	050	3
11	3	2	050	39	1	OVC/R	29.83	40	40	10	NS	34	050	4	050	3
12	ANCHORED		040	40	1	OVC/R	29.83	39	39	10	NS	34	050	3	050	2
13	ANCHORED		045	34	1	OVC/R	29.86	40	39	10	NS	34	045	3	040	2
14	ANCHORED		040	32	1	OVC/R	29.87	39	38	10	NS	34	040	3	040	2
15	ANCHORED		025	35	1	OVC/R	29.94	38	36	10	NS	24	040	3	040	2
16	ANCHORED		040	35	1	OVC/R	29.93	38	38	10	NS	34	040	3	040	2
17	ANCHORED		035	32	1	OVC/R	29.94	38	38	10	NS	34	030	3	035	2
18	ANCHORED		035	32	1	OVC/R	29.99	38	38	10	NS	34	030	2	035	2
19	ANCHORED		030	40	1	OVC/R	30.01	39	39	10	NS	34	030	3	040	2
20	ANCHORED		035	33	2	OVC/R	30.05	39	37	10	NS	34	035	3	040	2
21	ANCHORED		030	29	4	OVC/R	30.08	40	38	10	NS	34	030	3	040	2
22	ANCHORED		030	26	4	OVC/R	30.10	40	37	10	NS	35	030	3	040	2
23	ANCHORED		025	27	5	OVC/R	30.12	40	38	10	NS	35	030	3	035	2
24	ANCHORED		030	38	7	OVC/R	30.10	40	38	10	ST	35	030	3		-
TOT	59	3														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST			TIME	INITIALS
MATERIAL CONDITION	YOKE	1. Held quarters.			1300	BKF
READINESS CONDITION	IV	2. Chronometer(s) wound.			1130	BKF
OPERATIONAL STATUS	ALPHA	3. Held evening reports.			1945	BKF
MISSION	DOMESTIC FISHERIES	4. Magazines inspected.			0812	BKF
		4a. Maximum temperature: 65°F			4b. Minimum temperature: 57°F	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING				
IAW MACHINERY LOGS		Began	Ended	Type		
		1318	1400	GE-COLLISION		
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES						
AN/URF-23 XMR						
URC-9 UNF						
SCN-18						
			</			

LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL NAME

USCGC VIGOROUS (WMEC 427)

DAY

13 JUL 61

DATE

14 JUL 61

ZONE DESTINATION

44 (W. of S. C.)

I. WEATHER OBSERVATIONS

TIME	MILES	TENTS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	ANCHORED	RED	035	38	10	BKN	30.12	41	37	6	CU	35	035	3	-	-
02	ANCHORED	RED	035	42	10	BKN	30.12	41	37	6	CU	-	035	3	-	-
03	ANCHORED	RED	025	27	10	BKN	30.12	40	37	6	CU	-	035	3	-	-
04	ANCHORED	RED	040	21	10	BKN	30.12	39	37	6	CU	-	000	3	-	-
05	ANCHORED	RED	045	26	10	SC	30.15	38	37	3	CU	35	030	3	-	-
06	ANCHORED	RED	020	24	10	SC	30.12	38	36	3	CU	35	020	2	-	-
07	ANCHORED	RED	035	23	10	BKN	30.23	37	35	9	SC	35	025	2	-	-
08	5	0	023	18	10	OVC	30.22	37	35	10	SC	35	025	2	-	-
09	8	0	035	24	10	BKN	30.23	40	37	8	SC	35	035	3	020	6
10	7	9	030	22	10	BKN	30.22	38	35	8	SC	35	030	3	030	8
11	9	1	020	20	10	BKN	30.21	37	35	8	SC	35	020	3	050	9
12	10	4	020	17	10	BKN	30.21	37	35	8	SC	36	020	3	030	9
13	10	4	030	18	10	BKN	30.19	39	35	6	SC	37	020	3	030	9
14	10	6	030	18	10	BKN	30.19	39	35	6	SC	37	020	3	030	9
15	9	5	020	22	10	BKN	30.17	39	27	7	SC	35	020	3	030	12
16	9	9	356	20	10	BKN	30.15	39	37	6	SC	35	020	3	040	9
17	9	2	358	23	10	SC	30.13	40	38	2	SC	36	030	3	040	8
18	9	7	303	14	10	CLR	30.13	42	40	0	CLR	35	030	5	040	8
19	9	3	006	19	10	SC	30.13	42	40	2	SC	35	040	3	040	7
20	8	4	003	17	10	SC	30.13	40	37	2	AC	35	003	1	050	8
21	7	7	000	17	10	SC	30.13	40	38	3	AC	35	000	2	050	8
22	9	7	355	17	10	BKN	30.12	41	39	7	AC	35	355	2	030	8
23	9	5	005	17	10	BKN	30.12	41	39	7	AC	35	005	2	030	8
24	10	0	015	16	10	SC	30.12	41	39	1	AC	32	020	2	030	7
25	154	3														

II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YOKO	1. Held quarters.		1225	YTW
READINESS CONDITION	IV	2. Chronometer(s) wound.		1113	CRW
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1947	CRW
MISSION	FISHERIES	4. Magazines inspected.		0836	CRW
		4a. Maximum temperature:	63°F	4b. Minimum temperature:	37°F
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
LAW MACHINERY LOG		Began	Ended	Type	
		1240	1320	DC PQS - RADIAC SETS	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
A/C W/F - 23 X 472					
VRC - 9 W/F					
SDN - 18					
SUNRISE	0603	SUNSET	1911	D-41	
		Auth.	Attached	Leave	TAD
					Other
					On Board

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4390B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL STATION

USCGC VIGOROUS WMEC 627

DAY  
WEDNESDAY  
15 APR 87

DATE

15 APR 87

ZONE DESTINATION

14 QUEBEC

## I. WEATHER OBSERVATIONS

TIME	MILES	TENTS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB				DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	10	1	024	13	10	SCT	30.10	41	39	1	AC	32	050	2	050	72
02	9	6	012	14.5	10	SCT	30.09	41	39	1	AC	33	010	2	040	7
03	11	9	010	16	10	CLR	30.09	41	38	0	CC	33	010	1	030	5
04	11	2	000	15	10	CLR	30.10	41	39	0	CC	33	000	1	030	4
05	10	8	358	12	10	CLR	30.10	41	39	0	-	34	000	1	030	4
06	11	6	004	18	10	SCT	30.09	41	39	2	SC	34	020	1	050	4
07	10	0	000	16	10	SCT	30.11	41	39	2	CI	34	030	2	010	4
08	8	0	000	16	10	SCT	30.11	42	40	5	S/C	35	000	2	050	8
09	6	4	000	17	10	OVC	30.12	42	40	10	SC	35	000	2	050	8
10	9	8	000	15	10	OVC	30.12	42	40	10	SC	35	000	2	055	7
11	10	2	005	15	10	OVC	30.12	42	40	10	SC	35	005	2	050	7
12	10	4	015	16	10	OVC	30.11	43	41	10	SC	35	015	2	040	6
13	9	8	020	17	10	OVC	30.11	44	42	10	SC	34	020	1	075	5
14	5	8	030	16	10	OVC	30.09	46	43	10	SC	34	020	1	060	5
15	2	4	030	18	10	OVC	30.10	47	43	10	SC	35	020	1	060	5
16	4	7	030	14	4	OVC	30.09	41	40	10	SC	33	025	1	060	5
17	23	4	035	15	4	OVC	30.09	41	40	10	SC	34	025	1	060	5
18	5	2	030	17	3	OVC	30.07	40	40	10	ST	34	030	1	040	5
19	2	0	030	15	3	OVC	30.06	40	40	10	ST	35	030	1	040	5
20	8	9	033	18	3	OVC	30.07	41	40	10	ST	35	033	2	030	5
21	11	5	065	22	1	OVC/F	30.09	42	41	10	ST	35	065	2	030	5
22	11	6	055	15	2	OVC/F	30.10	42	41	10	ST	34	055	1	030	5
23	11	9	075	13	4	OVC/F	30.10	42	42	10	ST	35	075	1	030	5
24	10	7	065	13	3	OVC/F	30.11	42	42	10	ST	36	065	1	030	5
TOT	124	4														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YOKE	1. Held quarters.		1225	P.7W
READINESS CONDITION	IV	2. Chronometer(s) wound.		1107	QW
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	PAW
MISSION	FISHERIES	4. Magazines inspected.		0835	QW
		4a. Maximum temperature:		64° F	4b. Minimum temperature:
					37° F
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
IAW MACHINERY LOGS		Began	Ended	Type	
		1311	1521	GQ - 3' / 50 GUNEX	
		1740	1808	50 CAL GUNEX	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
AM/URT-72 XATR					
VRC-9 WNF					
SRN-18					



LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL ~~Station~~

DAY

DATE

ZONE DESTINATION

USCGC WMEC-627

THURSDAY 16 APR 87

+4 QUEBEC

I. WEATHER OBSERVATIONS

TIME	MILES	TENS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbol)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	10	8	058	14	3	OVC/R	30.10	42	41	10	ST	35	058	1	034	5
02	10	3	055	13	3	OVC/R	30.09	42	41	10	ST	35	055	1	036	4
03	9	8	060	14	3	OVC/R	30.07	43	42	10	ST	35	060	1	030	4
04	9	2	060	20	8	OVC	30.09	42	41	10	ST	35	060	1	040	3
05	9	6	060	18	8	OVC	30.09	42	41	10	ST	35	060	1	040	3
06	9	5	074	18	3	OVC/F	30.10	42	41	10	ST	35	060	1	040	3
07	8	9	076	20	2	OVC/F	30.12	41	40	10	ST	34	060	2	040	3
08	9	8	086	19	1	OVC/F	30.12	40	39	10	ST	34	080	2	075	4
09	10	5	055	18	1	OVC/F	30.11	40	40	10	ST	35	058	2	060	4
10	7	4	054	10	1	OVC/F	30.11	40	40	10	ST	35	050	2	060	2
11	9	6	067	13	2	OVC/F	30.11	41	40	10	ST	35	050	1	060	2
12	9	4	054	9	1	OVC/F	30.11	41	41	14	ST	35	054	1	-	-
13	3	4	050	12	1	OVC/F/R	30.10	41	41	10	ST	35	054	1	-	-
14	5	8	076	16	1	OVC/F	30.09	41	41	10	ST	35	050	1	060	2
15	7	0	069	10	1	OVC/F	30.11	40	40	10	ST	35	050	1	070	3
16	8	8	356	12	4	OVC/F	30.06	41	40	10	ST	35	356	1	050	3
17	8	7	020	10	4	OVC/F	30.06	40	40	10	ST	35	020	1	030	3
18	6	0	035	13	1	OVC/F	30.02	41	41	10	ST	35	035	1	035	2
19	5	2	076	8	5	OVC/F	30.03	41	41	10	ST	35	-	-	-	-
20	8	3	040	14	7	OVC/F	30.01	40	40	10	ST	35	040	1	-	-
21	11	0	040	15	1	OVC/F	30.04	41	41	14	ST	36	040	1	-	-
22	15	0	030	16	1	OVC/F	30.00	42	42	10	ST	36	040	1	060	1
23	15	1	030	13	1	OVC/F	29.98	42	42	10	ST	35	030	1	060	2
24	15	0	050	20	1	OVC/F	29.95	42	42	10	ST	35	050	1	060	-
TOT	214	1														

II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	<u>WKE</u>	1. Held quarters.		1225	PAW
READINESS CONDITION	<u>II</u>	2. Chronometer(s) wound.		1108	PAW
OPERATIONAL STATUS	<u>ALPHA</u>	3. Held evening reports.		2104	PAW
MISSION	<u>FISHERIES</u>	4. Magazines inspected.		0930	PAW
		4a. Maximum temperature:	65°	4b. Minimum temperature:	53°
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
IAW MACHINERY LOGS		Began	Ended	Type	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
SUNRISE	0557	SUNSET	1724	D-43	
				Auth.	Attached
				Leave	TAD
				Other	On Board

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4380B (Rev. 3-67)

# LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL NAME

USCGC Vigilant (WMEC 427)

DAY

Friday

DATE

17 April 87

ZONE/DESTINATION

+4 GULF

## I. WEATHER OBSERVATIONS

TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	15	0	040	22	1	OVC/F	29.92	42	42	10	ST	35	040	1	060	2
02	6	0	148	6	1	OVC/F	29.89	42	42	10	ST	35	040	1	060	2
03	8	0	135	12	1	OVC/F	29.86	42	42	10	ST	35	040	1	060	2
04	10	8	050	23	4	OVC/F	29.84	42	42	10	ST	34	050	2	080	4
05	15	7	050	20	3	OVC/F	29.82	42	42	10	ST	35	050	2	085	4
06	18	5	075	23	1	OVC/F	29.79	44	44	10	ST	35	075	2	060	5
07	8	8	065	18	2	OVC/F	29.78	45	45	10	ST	35	075	2	062	1
08	10	0	031	12.5	2	OVC/F	29.77	46	46	10	ST	36	070	2	060	3
09	14	0	022	16	2	OVC/F	29.77	47	47	10	ST	36	070	2	060	3
10	15	5	030	16	2	OVC/F	29.74	49	49	10	ST	37	060	2	050	3
11	14	2	060	16	5	OVC/F	29.72	50	50	10	ST	37	060	2	050	3
12	14	5	081	17	5	OVC/F	29.70	51	51	10	ST	37	080	3	090	3
13	14	7	100	12	6	SC	29.70	51	50	9	SC	37	090	32	080	3
14	14	4	214	6	6	OVC	29.67	50	49	10	SC	37	110	2	130	3
15	15	5	047	10	6	OVC	29.67	52	50	10	SC	37	180	2	150	3
16	14	8	115	10	6	OVC	29.65	56	54	410	SC	37	115	1	110	2
17	8	0	115	12	6	OVC/H	29.67	55	53	10	SC	37	115	1	110	2
18	ANCHORED		095	6	8	BKN/H	29.69	60	57	7	SC/R	37	-	-	135	2
19	ANCHORED		088	8	3	OVC	29.70	57	55	10	ST	40	-	-	110	2
20	ANCHORED		060	7	15	OVC/F	29.71	54	52	10	ST	40	-	-	110	2
21	ANCHORED		070	11	5	OK	29.74	53	52	10	ST	40	080	2	-	-
22	U/LW		075	11	15	OVC/F	29.75	52	51	10	ST	40	080	2	-	-
23	9	9	050	16	12	OVC/F	29.74	50	49	10	ST	36	050	2	070	2
24	9	8	050	16	12	OVC/F	29.74	50	49	10	ST	36	050	2	070	2
TOT	230	1														

## II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YONE	1. Held quarters.		1225	PAW
READINESS CONDITION	IV	2. Chronometer(s) wound.		1110	PAW
OPERATIONAL STATUS	ALPHA	3. Held evening reports.		1945	PAW
MISSION	OLP/OC5	4. Magazines inspected.		0850	SL
		4a. Maximum temperature:	65 °F	4b. Minimum temperature:	
				55 °F	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
1AW MACHINERY LOGS		Began	Ended	Type	
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
AN/USP-23 XMR					
ARC-9 UHF					
SON-18					
SUNRISE 0612		SUNSET 1939			
		D-44	Auth.	Attached	Leave
					TAD
					Other
					On Board

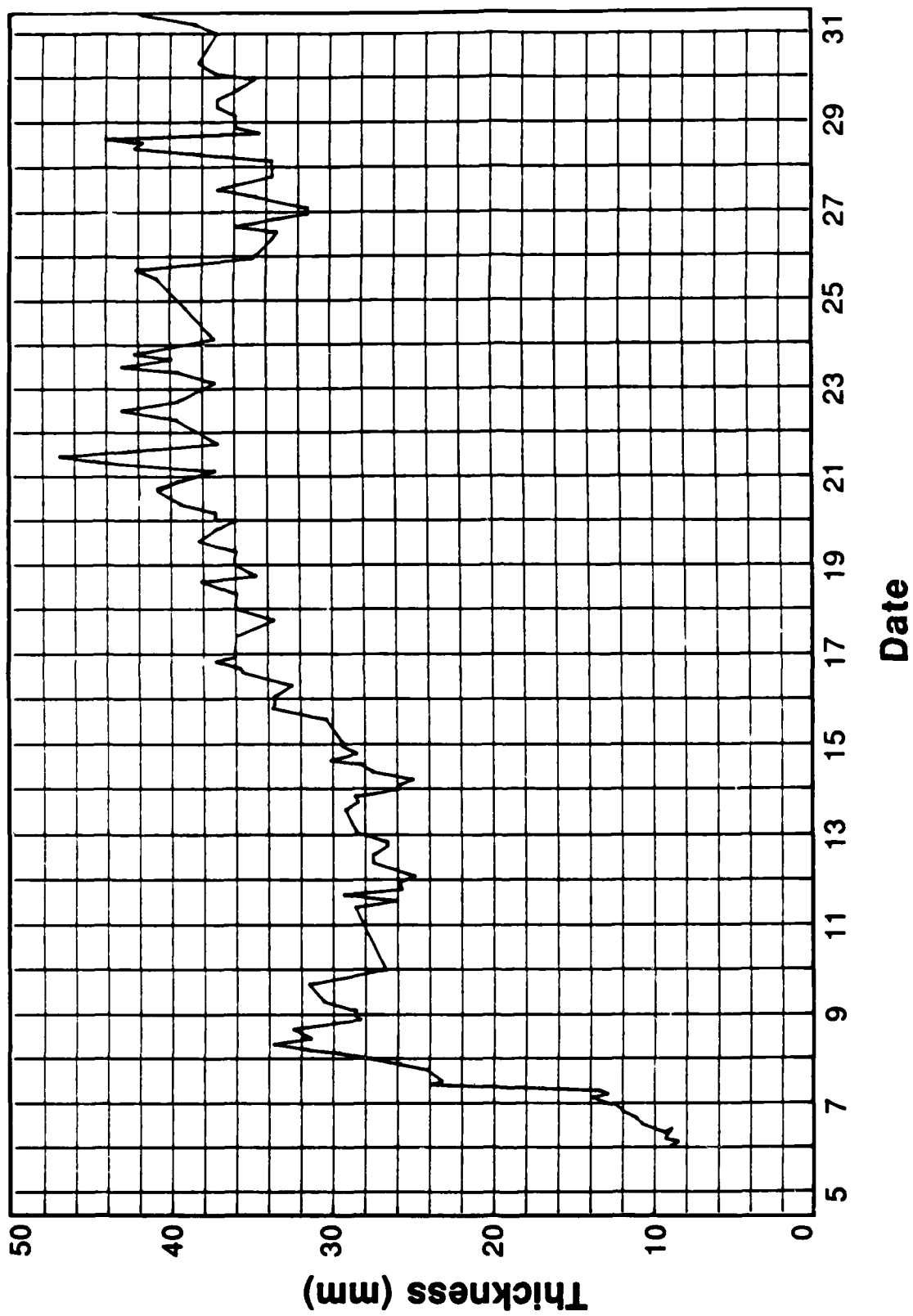


FIGURE D-1 Computed Values of Precipitable Water/NM for March Portion of CGC Vigorous Cruise

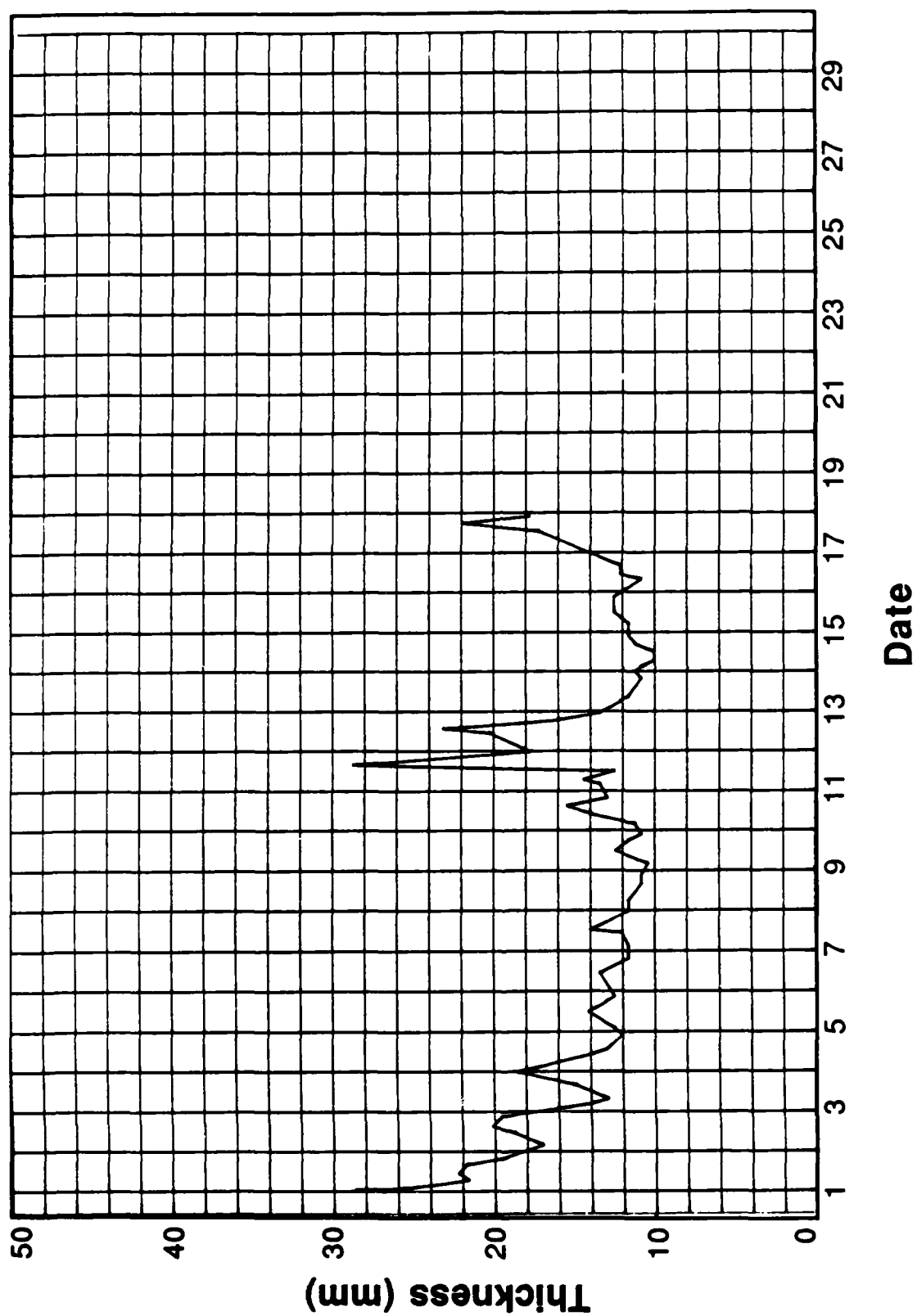


FIGURE D-2 Computed Values of Precipitable Water/NM for April Portion of CGC Vigorous Cruise

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-4380b (Rev. 1-67)

LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

*Darky Weak moonlight at  
most. -- 25% of  
time*

VESSEL NAME

USCGC DECISIVE (WMEC 629)

DAY

TUESDAY  
FEBRUARY

DATE

19 MAY 57

ZONE DESTINATION

+4 QUEBEC

1. WEATHER OBSERVATIONS

TIME	MILES	TERRAIN	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	14	0	125	13	10	RW	29.96	78	76	5	CN	78	120	1	CALM	
02	12	0	150	10	10	SCT	29.94	77	75	2	CU	78	150	1	CALM	
03	9	9	113	15	10	SCT	29.92	78	75	3	CU	79	170	1	CALM	
04	7	5	140	10	10	SCT	29.92	78	75	3	CU	76	115	1	CALM	
05	17	9	155	10	10	SCT	29.92	77	75	3	CU	76	120	1	CALM	
06	6	0	160	09	10	SCT	29.92	78	75	3	CU	76	121	1	CALM	
07	6	2	170	10	10	BKN	29.94	78	75	6	CU	76	150	1	CALM	
08	5	0	110	8	10	SCT	29.95	79	76	5	CU	80	CALM	150	1	
09	1	3	105	7	10	SCT	29.96	79	76	5	CU	80	CALM	150	1	
10	7	3	100	7	10	BKN	29.98	81	78	7	AC	78	CALM	140	1	
11	9	8	095	10	10	BKN	29.99	82	78	8	AC	81	100	1	150	2
12	8	9	100	10	10	BKN	29.99	82	78	8	AC	76	100	1	140	2
13	8	3	100	10	10	BKN	29.97	82	77	8	AC	76	100	1	140	1
14	8	0	120	9	10	BKN	29.96	83	79	9	AC	76	110	1	130	2
15	1	0	110	10	10	BKN	29.94	83	79	7	AC	76	110	1	140	2
16	13	8	130	9	10	BKN	29.92	82	76	6	AC	82	130	1	160	2
17	12	1	112	12	10	BKN	29.92	81	77	7	CU	82	112	1	150	2
18	13	8	125	12	10	BKN	29.91	80	76	5	CI	82	125	1	130	2
19	15	0	130	12	10	BKN	29.90	82	78	7	CU	82	130	1	130	1
20	13	0	130	10	10	BKN	29.90	80	76	5	CU	82	130	1	120	2
21	14	9	120	6	10	BKN	29.90	80	76	7	CS	82	120	1	130	2
22	2	1	120	8	10	BKN	29.92	80	77	6	CS	82	120	1	120	1
23	1	0	120	8	10	CT	29.93	80	77	4	AC	82	120	1	—	1
24	1	5	130	10	10	SCT	29.93	80	76	4	AC	81	130	1	CALM	
TOT	210	5														

11. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS	
MATERIAL CONDITION	YOKE	1. Held quarters.		1230	GAJ	
READINESS CONDITION	PERSON II	2. Chronometer(s) wound.		1130	DJL	
OPERATIONAL STATUS	ALFA	3. Held evening reports.		1945	MEK	
MISSION	ELT PATROL	4. Magazines inspected.		0930	PT	
		4a. Maximum temperature:		4b. Minimum temperature:		
		98°		64°		
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING				
BOTH M/D/E'S O/L IN P/H/C		Began	Ended	Type		
		1245	1252	MAN OVERBOARD		
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES						
CONTINUOUS RADIO GUARD						
		D-47				
		Auth.	Attached	Leave	TAD	Other
		8	10	2	2	2
SUNRISE 0654		SUNSET 2019		On Board		
DRAFT: F00		AFT		10		
				56		

DEPARTMENT OF TRANSPORTATION U. S. COAST GUARD CG-4300b (Rev. 3-67)				LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET												
VESSEL NAME				DAY		DATE		ZONE DESTINATION								
USCGC DECISIVE (WMEC 629)				WEDNESDAY		20 MAY 87		+ 4 QUEBEC								
I. WEATHER OBSERVATIONS																
TIME	MILES	TENDR	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbol)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	1	0	140	10	10	SCT	29.92	80	76	3	AC	81	140	1	—	2
02	2	0	120	10	10	SCT	29.91	80	76	3	AC	81	120	1	—	2
03	1	0	140	10	10	SCT	29.90	80	76	4	CU	81	140	1	110	2
04	5	0	140	9	10	SCT	29.90	79	77	4	CU	80	140	1	—	2
05	8	0	140	7	10	SCT	29.90	79	77	5	CU	80	140	1	—	2
06	7	5	140	11	10	SCT	29.91	80	76	4	CU	80	140	1	—	2
07	7	2	145	11	10	SCT	29.92	80	76	4	CU	80	140	1	110	2
08	7	5	130	11	10	SCT	29.93	80	76	5	CU	80	130	1	110	2
09	6	0	120	9	10	BKN	29.95	82	77	07	CU	80	120	1	130	2
10	1	3	120	10	10	BKN	29.96	82	77	07	CU	80	120	1	130	1
11	1	3	110	9	10	BKN	29.95	82	77	05	CU	80	110	1	120	1
12	3	5	120	09	10	BKN	29.98	83	78	06	CU	82	130	1	CALM	M
13	7	5	105	10	10	BKN	29.97	84	79	07	CU	82	120	1	CALM	M
14	3	0	120	10	10	BKN	29.98	85	79	07	CU	81	125	1	CALM	M
15	2	5	115	11	10	BKN	29.96	87	79	07	CU	81	130	1	CALM	M
16	2	0	120	8	10	SCT	29.95	86	80	4	CU	82	120	1	130	2
17	4	0	090	10	10	BKN	29.93	90	82	5	CU	82	090	1	130	2
18	15	5	105	10	10	BKN	29.92	83	78	5	CU	82	120	1	120	2
19	16	2	100	8	10	BKN	29.91	83	77	5	CU	82	110	1	130	2
20	16	8	105	9	10	BKN	29.93	83	77	6	CU	79	110	1	130	2
21	15	0	100	9	10	BKN	29.93	79	76	5	CU	78	110	1	130	2
22	14	2	110	8	10	SCT	29.95	79	75	4	CU	78	110	1	120	2
23	14	8	110	9	10	SCT	29.96	79	75	4	CU	78	110	1	—	1
24	14	5	090	4	10	SCT	29.97	77	73	3	CU	80	090	1	—	1
TOT	171	3														
II. OPERATIONAL SUMMARY																
STATUS AT 0001						CHECK LIST						TIME		INITIALS		
MATERIAL CONDITION						YOKE						1230		DR		
READINESS CONDITION						DEFCON V						1100		DR		
OPERATIONAL STATUS						ALFA						1945		DR		
MISSION						ELT PATROL						1150		DR		
						4a. Maximum temperature: 90°						4b. Minimum temperature: 62°				
MACHINERY CONDITION AND DISCREPANCIES						DRILLS AND TRAINING										
NO. 2 M/D/E O/L IN P/H/L NO. 1 M/D/E IN E/R/L ON LHR STBY						Began		Ended		Type						
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES																
CONTINUOUS RADIO GUARD																
SUNRISE 0658						SUNSET 2023						D-48		Auth.		

DEPARTMENT OF  
TRANSPORTATION  
U. S. COAST GUARD  
CG-1300B (Rev. 3-67)

LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL/STATION

USCGC DELISIVE (WMEC-629)

DAY

THUR

DATE

21 MAY 67

ZONE/DESTINATION

+4 QUEBEC

I. WEATHER OBSERVATIONS

TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	14	9	090	04	10	SCT	29.97	78	73	04	CU	78	090	1	-	1
02	15	1	095	05	10	SCT	29.96	78	74	04	CU	78	095	1	-	1
03	15	3	075	08	10	BKN	29.95	78	75	06	CU	78	075	1	-	1
04	15	0	125	05	10	BKN	29.94	76	74	07	CU	80	120	1	-	1
05	16	0	120	10	10	BKN	29.93	78	74	07	CU	80	125	1	CALM	
06	15	5	114	08	10	BKN	29.94	77	73	07	CU	80	120	1	CALM	
07	16	5	115	10	10	BKN	29.94	78	74	07	CU	80	CALM	110	1	
08	15	1	060	8	10	SCT	29.95	80	76	4	CU	79	070	1	080	1
09	14	7	075	10	10	SCT	29.97	82	76	4	CU	79	070	1	080	1
10	15	0	070	8	10	SCT	29.97	82	75	2	CU	79	070	1	080	1
11	12	2	060	12	10	SCT	29.99	82	76	4	CU	80	060	1	CALM	
12	12	0	050	0	10	SCT	29.99	83	76	05	CU	80	CALM	CALM		
13																
14																
15																
16	MODIFIED	115	09	10	10	SCT	29.95	90	81	04	CU	-	-	-	-	-
17	83	050	12	10	10	SCT	29.93	80	75	03	CU		050	1	050	1
18	83	055	13	10	10	SCT	29.92	80	75	03	CU	81	050	1	060	1
19	14	0	055	13	10	SCT	29.92	80	75	03	CU	81	050	1	060	1
20	14	0	060	14	10	SCT	29.92	80	75	03	CU	80	050	2	055	4
21	15	0	051	13	10	SCT	29.94	79	74	03	CU	80	050	2	055	4
22	15	5	050	13	10	SCT	29.96	78	75	03	CU	80	-	2	-	4
23	14	0	060	12	10	SCT	29.96	78	75	03	ST	060	-	2	-	4
24	14	2	060	14	10	SCT	29.96	80	75	3	SC	80	-	2	-	4
25	272	3														

II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS		
MATERIAL CONDITION YORE		1. Held quarters.		1700	MD		
WEATHER CONDITION DEFLON II		2. Chronometer(s) wound.		1017	MCK		
OPERATIONAL STATUS ALFA		3. Held evening reports.					
MISSION ELT PATROL		4. Magazines inspected.		0820	MCK		
		4a. Maximum temperature: 88°		4b. Minimum temperature: 64°			
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING					
BOTH M/D/E'S O/L IN M/H/K		Began	Ended	Type			
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES							
CONTINUOUS RADIO GUARD							
		TADKO					
D-49		Auth.	Attached	Leave	TAD	Other	On Board
SUNRISE 0745		8	10	0	0	0	10
SUNSET 2010							55

## LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

78117-0000

USCGC DECISIVE (WMEC 629)

**FRIDAY**

DATE \_\_\_\_\_

22 MAY 87

**ZONE DESTINATION**

+4 QUEBEC

## 1. WEATHER OBSERVATIONS

[illegible]

## 11. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS		
MATERIAL CONDITION	YOKE	1. Held quarters.		1230	AR		
READINESS CONDITION	DEFCON II	2. Chronometer(s) wound.		1100	AR		
OPERATIONAL STATUS	ALFA	3. Held evening reports.		1945	AR		
MISSION	ELT PATROL	4. Magazines inspected.		0735	AR		
		4a. Maximum temperature: 92°		4b. Minimum temperature: 68°			
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING					
BOTH M/D/E'S O/L IN P/H/C		Began	Ended	Type			
		1234	1255	ABANDON SHIP/PROVIDE			
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES							
CONTINUOUS RADIO GUARD							
D-50		TAD/06					
		Auth.	Attached	Leave	TAD	Other	On Board



## LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

7315-2207

USCGC DECISIVE (WMEC 629)

DATE	DAY	TIME	LOCATION	REMARKS
10/10/68	MON	0800	1010	1010
10/11/68	TUE	0800	1010	1010
10/12/68	WED	0800	1010	1010
10/13/68	THU	0800	1010	1010
10/14/68	FRI	0800	1010	1010
10/15/68	SAT	0800	1010	1010
10/16/68	SUN	0800	1010	1010
10/17/68	MON	0800	1010	1010
10/18/68	TUE	0800	1010	1010
10/19/68	WED	0800	1010	1010
10/20/68	THU	0800	1010	1010
10/21/68	FRI	0800	1010	1010
10/22/68	SAT	0800	1010	1010
10/23/68	SUN	0800	1010	1010
10/24/68	MON	0800	1010	1010
10/25/68	TUE	0800	1010	1010
10/26/68	WED	0800	1010	1010
10/27/68	THU	0800	1010	1010
10/28/68	FRI	0800	1010	1010
10/29/68	SAT	0800	1010	1010
10/30/68	SUN	0800	1010	1010
10/31/68	MON	0800	1010	1010
11/01/68	TUE	0800	1010	1010
11/02/68	WED	0800	1010	1010
11/03/68	THU	0800	1010	1010
11/04/68	FRI	0800	1010	1010
11/05/68	SAT	0800	1010	1010
11/06/68	SUN	0800	1010	1010
11/07/68	MON	0800	1010	1010
11/08/68	TUE	0800	1010	1010
11/09/68	WED	0800	1010	1010
11/10/68	THU	0800	1010	1010
11/11/68	FRI	0800	1010	1010
11/12/68	SAT	0800	1010	1010
11/13/68	SUN	0800	1010	1010
11/14/68	MON	0800	1010	1010
11/15/68	TUE	0800	1010	1010
11/16/68	WED	0800	1010	1010
11/17/68	THU	0800	1010	1010
11/18/68	FRI	0800	1010	1010
11/19/68	SAT	0800	1010	1010
11/20/68	SUN	0800	1010	1010
11/21/68	MON	0800	1010	1010
11/22/68	TUE	0800	1010	1010
11/23/68	WED	0800	1010	1010
11/24/68	THU	0800	1010	1010
11/25/68	FRI	0800	1010	1010
11/26/68	SAT	0800	1010	1010
11/27/68	SUN	0800	1010	1010
11/28/68	MON	0800	1010	1010
11/29/68	TUE	0800	1010	1010
11/30/68	WED	0800	1010	1010
12/01/68	THU	0800	1010	1010
12/02/68	FRI	0800	1010	1010
12/03/68	SAT	0800	1010	1010
12/04/68	SUN	0800	1010	1010
12/05/68	MON	0800	1010	1010
12/06/68	TUE	0800	1010	1010
12/07/68	WED	0800	1010	1010
12/08/68	THU	0800	1010	1010
12/09/68	FRI	0800	1010	1010
12/10/68	SAT	0800	1010	1010
12/11/68	SUN	0800	1010	1010
12/12/68	MON	0800	1010	1010
12/13/68	TUE	0800	1010	1010
12/14/68	WED	0800	1010	1010
12/15/68	THU	0800	1010	1010
12/16/68	FRI	0800	1010	1010
12/17/68	SAT	0800	1010	1010
12/18/68</				

SATURDAY

DATE \_\_\_\_\_

23 MAY 87

**ZONE DESTINATION**

+ 4 QUEBEC

## 1. WEATHER OBSERVATIONS

[illegible]

## 11. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS
MATERIAL CONDITION	YOKÉ	1. Held quarters.			
READINESS CONDITION	DEFCON II	2. Chronometer(s) wound.		1020	HCK
OPERATIONAL STATUS	ALFA	3. Held evening reports.		1945	B
MISSION	ELT PATROL	4. Magazines inspected.		1100	HCK
		4a. Maximum temperature:		4b. Minimum temperature:	
		88°		64°	
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING			
NO 1 M/D/E IN EML ON LINE STBY		Began	Ended	Type	
NO 2 M/D/E 9/L IN P/H/K					
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES					
CONTINUOUS RADIO GUARD					

DEPARTMENT OF TRANSPORTATION U. S. COAST GUARD CG-4300B (Rev. 3-67)		LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET														
VESSEL/STATION						DAY	DATE	ZONE/DESTINATION								
USCGC DECISIVE (NMEC 629)						SATURDAY	24 MAY 87	+4 QUEBEC								
1. WEATHER OBSERVATIONS																
TIME	MILES	TENDR	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	4	6	100	14	10	SCT	29.95	79	74	4	CU	79	—	2	—	3
02	1	7	070	14	10	SCT	29.93	78	75	4	CU	79	—	2	—	3
03	6	0	050	11	10	SCT	29.92	78	74	4	CU	79	—	1	—	3
04	5	2	060	11	10	SCT	29.91	78	74	4	CU	78	—	1	—	3
05	7	1	075	16	10	SCT	29.90	78	74	4	CU	78	—	1	—	3
06	5	2	070	15	10	SCT	29.94	78	74	4	CU	78	—	2	—	3
07	5	5	060	16	10	BKN	29.95	78	74	6	CU	78	060	2	070	4
08	3	5	080	14	10	BKN	29.96	78	74	7	CU	80	080	2	080	3
09	4	9	085	16	10	BKN	29.97	79	75	5	CU	80	085	2	085	3
10	5	0	085	17	10	SCT	29.98	79	75	4	CU	80	085	2	085	3
11	5	9	085	17	10	BKN	29.99	79	75	6	CU	80	085	2	085	3
12	9	5	070	16	10	BKN	29.98	79	76	7	CU	80	080	2	090	4
13	3	0	055	14	10	BKN	29.99	79	75	7	CU	80	082	2	090	4
14	8	9	060	14	10	BKN	29.98	81	76	7	CU	80	071	2	075	3
15	6	0	070	13	10	BKN	29.99	81	75	7	CU	80	075	2	080	4
16	6	2	040	15	10	BKN	29.96	83	76	6	CU	81	040	2	060	4
17	6	5	050	16	10	BKN	29.94	83	77	5	CU	81	050	2	060	4
18	4	2	050	15	10	BKN	29.94	82	76	5	CU	81	050	2	060	4
19	1	1	045	16	10	BKN	29.94	80	76	5	CU	81	050	2	060	4
20	6	5	050	15	10	BKN	29.94	80	76	5	CU	81	050	2	060	4
21	4	7	040	14	10	BKN	29.96	79	74	6	CU	81	040	2	060	4
22	3	8	100	19	10	BKN	29.96	78	74	6	CU	81	100	2	080	4
23	2	2	090	17	10	BKN	29.97	78	74	6	CU	81	090	2	080	4
24	0	9	085	14	10	SCT	29.97	79	75	3	CU	81	085	2	080	3
25	12	1														
11. OPERATIONAL SUMMARY																
STATUS AT 0001						CHECK LIST				TIME	INITIALS					
VESSEL CONDITION						1. Held quarters.				1945	GA					
WEATHER CONDITION						2. Chronometer(s) wound.				1130	GA					
VESSEL STATUS						3. Held evening reports.				1945	GA					
VESSEL STATUS						4. Magazines inspected.				1110	GA					
VESSEL STATUS						4a. Maximum temperature:				88°						
VESSEL STATUS						4b. Minimum temperature:				64°						
VESSEL STATUS						DRILLS AND TRAINING										
VESSEL STATUS						Began	Ended	Type								
VESSEL STATUS																
VESSEL STATUS																
VESSEL STATUS</																

LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL/STATION **USCGC DECISIVE (WMEC 629)** DAY **MONDAY** DATE **25 MAY 87** ZONE/DESTINATION **44 QUEBEC**

I. WEATHER OBSERVATIONS

TIME	MILES	TENTHS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	1	1	070	18	10	SCT	29.94	78	74	03	CU	80	070	2	080	3
02	10	6	070	13	10	SCT	29.92	78	74	04	CU	80	070	2	080	4
03	10	5	060	13	10	BKN	29.91	77	74	08	CU	80	060	2	—	4
04	13	0	070	10	10	BKN	29.90	77	74	07	CU	80	—	2	—	4
05	13	9	060	10	10	BKN	29.90	78	74	07	CU	80	—	2	—	3
06	13	4	065	12	10	BKN	29.90	78	74	07	CU	80	110	2	100	3
07	15	3	065	14	10	BKN	29.91	78	74	07	CU	80	060	2	065	3
08	15	1	045	12	10	SCT	29.92	79	75	4	CU	78	050	2	080	4
09	13	2	050	12	10	BKN	29.93	80	76	7	CU	78	050	1	080	4
10	15	6	050	11	10	SCT	29.94	81	76	4	CU	78	050	1	080	3
11	15	7	060	13	10	SCT	29.95	81	76	4	CU	79	060	1	070	3
12	16	1	045	13	10	SCT	29.96	81	76	4	CU	80	050	1	070	3
13	15	1	045	16	10	BKN	29.93	80	76	8	SC	80	045	1	080	3
14	13	3	047	17	10	BKN	29.92	80	75	7	SC	80	050	1	080	3
15	13	0	050	17	10	SCT	29.90	80	75	4	SC	80	050	1	080	3
16	14	5	045	20	10	SCT	29.88	79	75	4	CU	80	045	1	080	3
17	13	5	030	17	10	SCT	29.87	79	75	5	CU	80	030	1	020	2
18	15	3	034	16	10	SCT	29.86	80	76	5	CU	80	035	1	020	2
19	15	1	045	15	10	SCT	29.86	80	76	5	CU	80	041	1	025	2
20	15	5	040	14	10	BKN	29.88	80	76	6	CU	80	040	1	030	3
21	14	5	050	15	10	BKN	29.88	80	76	5	CU	80	—	1	—	3
22	7	8	060	15	10	SCT	29.89	79	76	2	CU	80	—	1	—	3
23	15	5	065	15	10	SCT	29.89	79	76	2	CU	80	—	1	—	3
24	16	5	070	15	10	SCT	29.89	79	76	3	CU	80	—	1	—	2
TOT	223	1														

II. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS			
MATERIAL CONDITION YOKO		1. Held quarters.		1230	AT			
READINESS CONDITION DEFCON II		2. Chronometer(s) wound.		1020	LEK			
OPERATIONAL STATUS ALFA		3. Held evening reports.		—	—			
MISSION ELT PATROL		4. Magazines inspected.		1140	AT			
		4a. Maximum temperature: 88°		4b. Minimum temperature: 64°				
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING						
		Began	Ended	Type				
#1 M/D/F 9/1 IN P/HK		1239	1328	UG, SET ZEBRA				
#2 M/D/F IN F/HK 15 MIN STBY								
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES								
CONTINUOUS RADIO GUARD								
				TAD/OPS				
		Personnel	Auth.	Attached	Leave	TAD	Other	On Board
SUNRISE 0630			8	10	0	0	0	10
SUNSET 1745		D-53	60	63	1	3	1	64
DRAFT: 700								
APT								

DEPARTMENT OF TRANSPORTATION U. S. COAST GUARD CG-43806 (Rev. 3-67)		LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET														
VESSEL / COMMAND		DAY		DATE		ZONE / DESTINATION										
USCGC DECISIVE (WMEC 679)		TUESDAY		26 MAY 87		+4 QUEBEC										
I. WEATHER OBSERVATIONS																
TIME	MILES	TENDS	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	15	0	065	14	10	OCT	29.88	79	76	3	CU	80	—	1	—	2
02	13	9	070	15	10	SCT	29.88	79	76	4	CU	80	—	1	—	3
03	15	8	055	16	10	SCT	29.88	78	75	4	CU	80	—	2	—	3
04	12	6	045	15	10	SCT	29.87	78	74	1	CU	80	045	2	—	3
05	15	3	058	15	10	SCT	29.87	78	74	2	CU	80	058	2	—	3
06	17	0	053	13	10	BKN	29.87	78	75	06	CU	80	053	2	040	3
07	13	2	045	15	10	BKN	29.89	75	75	06	CU	80	045	2	060	2
08	14	0	054	13	10	BKN	29.91	80	75	06	CU	80	050	1	060	2
09	13	2	049	14	10	BKN	29.92	81	76	07	CU	80	050	1	062	2
10	17	0	060	12	10	BKN	29.94	81	75	07	CU	80	055	1	060	2
11	9	7	062	12	10	BKN	29.94	81	76	07	CU	80	059	1	062	2
12	6	9	324	9	10	SCT	29.94	81	76	1	CU	82	350	1	350	2
13	17	1	350	10	10	SCT	29.93	81	76	1	CU	82	350	1	050	2
14	14	6	000	8	10	SCT	29.92	82	78	1	CU	82	350	1	CALM	
15	2	0	005	6	10	SCT	29.91	87	80	2	CU	82	CALM		CALM	
16	12	0	000	10	10	SCT	29.90	85	79	02	CU	81	CALM		040	2
17	15	6	020	11	10	SCT	29.89	83	80	02	CU	81	020	2	040	3
18	16	8	010	11	10	SCT	29.88	83	80	02	CU	81	020	2	040	3
19	15	8	005	11	10	SCT	29.88	83	80	02	CU	81	010	2	030	3
20	4	5	010	8	10	SCT	29.89	79	76	02	CU	80	010	1	030	1
21	11	2	355	8	10	SCT	29.91	79	77	04	CU	80	355	1	—	1
22	14	4	340	9	10	BKN	29.93	79	77	05	CU	80	340	1	—	1
23	16	5	350	7	10	SCT	29.93	79	77	04	CU	80	350	1	—	1
24	16	2	355	7	10	SCT	29.93	79	77	04	CU	80	350	1	—	2
TOT	319	9														
II. OPERATIONAL SUMMARY																
STATUS AT 0001							CHECK LIST				TIME		INITIALS			
MATERIAL CONDITION Yoke							1. Held quarters.				1225		MEK			
READINESS CONDITION DECON IV							2. Chronometer(s) wound.				1045		AIR			
OPERATIONAL STATUS ALFA							3. Held evening reports.				1945		PS			
MISSION ELT PATROL							4. Magazines inspected.				0917		AIR			
							4a. Maximum temperature: 88°				4b. Minimum temperature: 62°					
MACHINERY CONDITION AND DISCREPANCIES							DRILLS AND TRAINING									
BOTH M/D/E O/L IN P/H/C							Began		Ended		Type					
							1233		1332		GG DRILL					
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES																
CONTINUOUS RADIO GUARD																
							TAD/OB									
SUNRISE 0620							Personnel		Auth.		Attached		Leave			

DEPARTMENT OF TRANSPORTATION U. S. COAST GUARD CG-4300B (Rev. 3-67)		LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET														
VESSEL/STATION						DAY		DATE		ZONE/DESTINATION						
USCGC DECISIVE (WMEC 629)						SATURDAY		06 JUN 87		+4 QUEBEC						
I. WEATHER OBSERVATIONS																
TIME	MILES	TENDR	WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbol)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
01	5	0	070	15	9	SCT/H	29.81	83	80	2	SC	82	070	2	050	4
02	4	8	070	12	9	SCT/H	29.79	83	80	2	SC	82	070	1	050	4
03	3	8	060	10	9	SCT	29.77	82	79	2	SC	82	-	1	-	4
04	4	0	070	14	10	SCT	29.75	82	79	1	CB	83	070	1	-	4
05	6	0	080	13	10	SCT	29.76	82	79	1	CU	83	080	1	-	4
06	6	0	080	16	10	SCT	29.78	82	79	2	CU	83	080	1	055	3
07	6	1	100	16	10	SCT	29.79	82	79	4	CU	83	100	1	090	3
08	6	0	099	18	10	SCT	29.81	84	80	4	CU	83	090	3	100	3
09	6	0	099	16	10	SCT	29.82	84	80	5	CU	83	100	3	105	3
10	5	0	105	16	10	SCT/H	29.84	86	82	5	SC	83	100	3	110	4
11	8	5	105	16	10	SCT/H	29.84	86	82	5	SC	83	100	3	110	4
12	4	5	109	14	10	SCT/H	29.83	80	82	5	SC	83	100	2	105	4
13	6	0	104	18	10	SCT	29.81	87	84	5	SC	83	100	2	110	4
14	6	0	110	17	10	SCT	29.79	86	85	5	SC	83	105	2	110	4
15	5	5	112	17	10	SCT	29.78	89	88	5	SC	83	105	2	110	4
16	5	2	075	16	10	SCT	29.77	88	86	5	SC	84	100	3	110	4
17	5	7	070	16	10	SCT	29.77	89	88	5	SC	84	080	3	100	4
18	6	0	075	16	10	SCT	29.79	89	88	5	SC	84	090	3	115	4
19	5	5	075	16	10	SCT	29.79	85	85	5	SC	84	090	3	110	4
20	5	0	090	20	10	SCT	29.80	83	80	5	AS	83	090	3	100	4
21	6	0	090	20	10	SCT	29.82	83	79	3	CU	83	090	3	100	4
22	6	0	090	20	9	SCT/H	29.83	83	79	3	FC	83	090	3	100	4
23	10	2	095	19	9	RKN/H	29.84	83	79	7	CU	83	090	3	100	4
24	9	9	085	25	10	SCT	29.83	83	79	4	CU	82	075	4	100	6
TOT	139	7														
II. OPERATIONAL SUMMARY																
STATUS AT 0001						CHECK LIST				TIME		INITIALS				
MATERIAL CONDITION						YOKE				1230		JAR				
READINESS CONDITION						DEFCON IV				1125		JFK				
OPERATIONAL STATUS						ALFA										
MISSION						ELT PATROL				0912		JFK				
						4a. Maximum temperature:				92		4b. Minimum temperature:				
										64						
MACHINERY CONDITION AND DISCREPANCIES						DRILLS AND TRAINING										
NO. 1 M/D/E O/L IN P/H/C						Began		Ended		Type						
NO. 2 M/D/E IN E/R/C ON 1																

DEPARTMENT OF TRANSPORTATION U. S. COAST GUARD CG-1300B (Rev. 3-67)				LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET												
VESSEL/STATION								DAY		DATE		ZONE/DESTINATION				
USCGC DECISIVE (WMEC 629)								WEDNESDAY		10 JUN 67		+4 QUEREC				
I. WEATHER OBSERVATIONS																
TIME	MILES	TENDR	WINDS IF ESTIMATED		VISI-BILITY (Miles)	WEATHER (Symbol)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT-ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT-ION (True)	HEIGHT (Feet)	DIRECT-ION (True)	HEIGHT (Feet)
01	8	0	100	18	10	SCT	29.83	83	78	4	SC	83	100	2	090	5
02	4	0	090	22	10	SCT	29.82	83	78	3	SC	83	090	3	090	5
03	2	5	085	24	10	SCT	29.82	83	79	3	CU	83	085	3	080	5
04	6	0	100	21	10	SCT	29.82	82	79	3	CU	83	100	2	090	5
05	7	9	090	21	10	SCT	29.82	82	79	4	CU	83	090	2	090	5
06	5	0	095	26	10	SCT	29.81	83	79	5	CU	83	095	3	095	5
07	6	8	105	25	14	SCT	29.83	83	80	4	CU	83	100	4	095	7
08	7	3	102	25	10	BKN	29.83	83	80	6	CU	83	110	4	090	7
09	5	1	100	25	10	BKN	29.83	84	81	8	CS	83	100	4	090	7
10	5	1	101	24	10	OVC	29.84	84	83	10	CS	83	100	4	090	7
11	5	5	100	21	7	OVC	29.84	86	86	10	CS	83	100	4	090	7
12	5	8	100	22	8	OVC	29.83	86	86	10	CS	82	100	4	105	7
13	5	9	100	21	8	OVC	29.82	86	86	10	CS	82	100	4	105	7
14	4	3	100	22	8	OVC	29.79	87	87	10	CS	82	100	4	105	7
15	4	5	100	21	8	OVC	29.79	86	81	10	CS	82	100	5	105	57
16	6	0	105	20	8	OVC	29.77	86	81	10	CS	81	095	3	100	6
17	7	1	100	20	8	OVC	29.74	85	81	10	CS	81	092	3	100	6
18	6	2	104	21	8	OVC	29.74	85	81	10	CS	81	095	3	100	6
19	7	0	108	20	8	OVC	29.76	84	81	08	CU	81	095	3	105	6
20	6	0	100	22	8	BKN	29.78	82	80	5	AS	83	100	3	090	6
21	2	5	095	23	8	BKN	29.79	82	79	6	AS	83	090	3	090	6
22	2	5	090	21	8	SET/H	29.81	82	79	4	AS	83	090	3	090	6
23	2	0	095	20	8	SET/H	29.82	82	79	4	AS	83	095	3	090	6
24	3	0	080	23	10	H	29.83	82	78	2	CU	82	080	3	090	7
TOT	128	0														
II. OPERATIONAL SUMMARY																
STATUS AT 0001								CHECK LIST				TIME		INITIALS		
MATERIAL CONDITION VOKE								1. Held quarters.				1225		QK		
READINESS CONDITION DEFCON II								2. Chronometer(s) wound.				1113		MEK		
OPERATIONAL STATUS ALFA								3. Held evening reports.				1945		MEK		
MISSION ELT PATROL								4. Magazines inspected.				0734		PJ		
								4a. Maximum temperature: 92				4b. Minimum temperature: 69				
MACHINERY CONDITION AND DISCREPANCIES								DRILLS AND TRAINING								
NO 1 M/D/E O/L IN P/H/C								Began		Ended		Type				
NO 2 M/D/E IN E/R/C ON 1 HR. STBY								1029		1110		FIRE AT SEA				

## LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET

VESSEL STATION

DAY

DATE \_\_\_\_\_

ZONE DESTINATION

USCGC DECISION (WMEC 629)

MON

15 JUN 87

+4 QUEBEC

## 1. WEATHER OBSERVATIONS

[illegible]

## 11. OPERATIONAL SUMMARY

STATUS AT 0001		CHECK LIST		TIME	INITIALS			
MATERIAL CONDITION	YOKE	1. Held quarters.		1225	GH			
READINESS CONDITION	DEFCON II	2. Chronometer(s) wound.		1100	BR			
OPERATIONAL STATUS	ALFA	3. Held evening reports.		—	—			
MISSION	ELTPAT	4. Magazines inspected.		1103	BR			
		4a. Maximum temperature: 92		4b. Minimum temperature: 64				
MACHINERY CONDITION AND DISCREPANCIES		DRILLS AND TRAINING						
BOTH M/D/E'S O/L IN P/H/C		Began	Ended	Type				
		1955	2015	PYRO DEMONSTRATION				
ELECTRONIC/COMMUNICATION CONDITION AND DISCREPANCIES								
CONTINUOUS RADIO GUARD								
		TAD/AB						
		Personnel	Auth.	Attached	Leave	TAD	Other	On Board
SUNRISE 0613	SUNSET 1954	D-57	8	108	0	0	1	9
DRAFT: PUG	APT		60	63	7	3	1	54

DEPARTMENT OF TRANSPORTATION U. S. COAST GUARD CG-4300B (Rev. 5-67)		LOG - WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET														
VESSEL/UNIT					DAY		DATE		ZONE/DESTINATION							
USCGC DECISIVE (NMEL 629)																
1. WEATHER OBSERVATIONS																
TIME	DAY	MONTH	<input type="checkbox"/> WINDS IF ESTIMATED		VISI- BILITY (Miles)	WEATHER (Symbols)	BAROMETER (Inches) SEA LEVEL	TEMPERATURE (Degrees)		CLOUDS		SEA WATER TEMP. (Degrees)	SEA WAVES		SWELL WAVES	
			DIRECT- ION (True)	FORCE (Knots)				DRY BULB	WET BULB	AMOUNT (Tenths)	TYPE		DIRECT- ION (True)	HEIGHT (Feet)	DIRECT- ION (True)	HEIGHT (Feet)
20	28	MAY	150	6	10	Bk Cl	29.91	82	78	5	Sr Cum	83	150	1	170	2
	17	JUN	095	12	10	Bk Cl	29.98	81	78	7	Sr Cum	82	085	2	060	3

WEATHER DATA FOR DECISIVE CRUISE

--OBTAINED BY TELCON--



## APPENDIX E

### OBSERVATION SUMMARY MEMORANDA FROM SHIP PERSONNEL

A copy of the After Action Report of the Commanding Officer of the CGC VIGOROUS and a set of notes from watchstanders on his ship describing the use of the FLIR are reproduced in this appendix. Also a memorandum from the Commanding Officer of the CGC DECISIVE to the Commanding Officer of the R&D Center evaluating the performance of the FLIR is reproduced.

[ BLANK ]

From: Commanding Officer, USCGC VIGOROUS (WMEC 627)  
To: Commander, Atlantic Area Coast Guard  
Date: 28 April 1987  
Subject: AFTER ACTION REPORT....CRUISE 05 MARCH - 21 APRIL  
1987

2. Comments/Recommendations

d. As requested by the Coast Guard Research and Development Center, VIGOROUS served as the testing platform for a forward looking infrared (FLIR) scope. The scope was mounted on the flying bridge six feet from our magnetic compass. The FLIR's proximity to the compass caused approximately eight degrees deviation when energized. It also caused a slight degradation to the lookout's night vision. A separate lookout manned the FLIR from one half hour after sunset to one half hour before sunrise. Eleven crew members stood a total of 374 hours on the "FLIR Watch." The FLIR is a valuable tool when searching for a specific target since nighttime profiling and sizing is accomplished. Dedicating a specific watchstander to FLIR, exclusive of the lookout, is not feasible for prolonged periods of time at present manning levels particularly while conducting special ops (i.e. -HMIO, fog navigation, towing, etc.). A remote bridge monitor for periodic scanning by bridge personnel or red-lens screening for the normal lookout's periodic scanning would help circumvent manning restrictions.

-----

#### FLIR Notes from watchstanders

1. Most problems and criticism caused by the FLIR mount. Should be made sturdier with a wider base, similar to the BIG EYES binoculars. If the FLIR unit were made heavier, like the BIG EYES, our watchstanders feel it would be easier to handle since it would not be as prone to vibration.
2. All friction points on the FLIR should have bearings on it, instead of straight friction joints, to make scanning easier.
3. If possible, could the focus and magnification knobs be moved to the lens area of the FLIR? They were tough to reach while looking through the FLIR, and difficult to locate at night by feel alone.
4. Functional notes:
  - usually always contacts were identified first through the BIG EYES rather than by the FLIR. This was also attributed to our not having had any unlit vessels at night not detected by radar.
  - green display affects night vision. Could a red lens be placed on the display? That would not affect night vision at all, and therefore the regular lookouts could use the FLIR rather than having an additional lookout, as we had during the patrol.
  - FLIR should be on a little higher stand; the flying bridge on the VIGOROUS had many obstructions (antennae, the mast, the BIG EYES, etc.). The FLIR could do better a little higher to overlook those bridge obstructions.
5. Notable contact information: FLIR generally did not pick up contacts well down south. Up north, contacts were picked up at great distances, up to 10 miles. Temperature differentials was the answer. A regular nightscope may have worked better down south, since contacts did not appear that well. The FLIR picked up fixed fishing gear well up north, and information was relayed to the CONN in time to avoid. Conceptually, the FLIR would be perfect for man overboards.
6. Future configurations: TV monitor connecting FLIR to bridge watch; CO could then get more information on boarding targets at night before boarding party is sent over to vessels.
7. General findings: Besides for picking up unlit vessels at night, the FLIR, as configured and designed now, was more of a burden than help. With a red lens, sturdier base, and more solid construction, the FLIR would be a great aid for the lookouts. We recommend these modifications for the best implementation on Coast Guard units.



3980  
17 Jun 87

From: Commanding Officer, USCGC DECISIVE (WMEC 629)  
To: Commanding Officer, USCG Research & Development Center

Subj: EVALUATION OF SHIPBOARD MOUNTED FLIR

1. The FLIR (Texas Instruments Lightweight Shipboard Electro-Optical Sensor) was installed prior to our departure on 18 May 1987. The location selected for the most unobstructed view was the flying bridge adjacent to the lookout station. The nine-inch monitor was placed conveniently in an open cabinet, forward on the port side of the bridge and the power pack/video gear was oriented athwartships against the after bulkhead under the starboard window. All cables were led through the overhead and out a side window to the FLIR. Once underway, R&D technician, Mr. Bob Berry, conducted a briefing on the operation and capabilities of the FLIR with all the non-watchstanding petty officers who would be operators.

2. Our first night at sea was the clearest night in about three years. Outside Tampa Bay were many ships and small vessels with which to test the FLIR capabilities. The first ship observed was a 600 foot cruise liner that was visually confirmed at about six nautical miles. At about five miles, the stack became visible through the FLIR, and at about three miles the overboard discharge was identified. Not until a range of approximately two miles was the ship identified by type with the FLIR.

3. The FLIR was manned, in the beginning, from 2100 to 0500, and was used as a normal, scanning lookout watch. The first two nights of watch revealed that this would be counter-productive since our regular, flying bridge lookout was reporting contacts as usual at six to fifteen miles while the FLIR watch saw nothing. We rarely closed vessels to less than two nautical miles and small vessels of 100 feet or less were not visible beyond two miles. Continuous scanning tended to cause some eye strain, so scanning was done for five to ten minutes followed by a brief rest. In addition, the range/size reticle within the device proved to be distracting to the lookout. Night vision was not seriously impacted by the green light of the FLIR so the red filter was not used. The lack of contacts seen by the FLIR watchstander proved taxing, so we shifted the FLIR watch to an on-call basis, activated when we wanted to get a close-up view of contacts of interest.

4. We were unable to completely evaluate far, intermediate and near distances since FLIR's range ability was so limited. On the

3980  
17 Jun 87

Subj: EVALUATION OF SHIPBOARD MOUNTED FLIR

occasions that we closed a vessel for LE purposes, the device did make available another window for details. It allowed us to observe vessel type and construction, monitor crew movement, and examine possible heat sources prior to illumination and boarding. Once the boarding was in progress, the FLIR became insignificant for that vessel. As comparison between the FLIR and the NVS-500 night vision scope, the NVS-500 is a more capable detector at a distance greater than two miles, but for close in detail, the FLIR is a better choice.

5. During our investigation of the F/V CLARIBEL, which contained over 30,000 pounds of marijuana, no particular heat was observed that could be identified as decomposing marijuana. However, if the vessel had been of fiberglass construction, that might have been different. The engine space and exhaust were clearly identifiable and, in another case, we were able to confirm that a vessel had been at anchor for some time due to the lack of heat detection.

6. Throughout the patrol, we had opportunities to encounter many types of vessels ranging from 800' tankers to 29' sailboats. Only on a very few occasions were any vessels visible through the FLIR at a range of over three miles. FLIR clarity became progressively worse the farther south we travelled. Between the latitudes of 15 and 12 degrees north we were not generally able to detect contacts farther than one mile, and there was considerable "fogginess" in the field of vision when scanning out from the ship beyond 1,000 yards. Within 1,000 yards the sea was clearly visible. Of particular note, during our patrol time between 12 and 13 degrees north latitude, our visibility was reduced to a maximum of eight miles as a result of red-brown Sahara dust blown west by the tradewinds.

7. After ten days of operation, the FLIR developed a full ground. Mr. Berry and DECISIVE's EMC attempted to identify and correct the problem, but a full ground remained in its power source. The equipment was secured until mid-patrol break arrival in Martinique where a Texas Instruments repair representative flew to meet us. The technician replaced the power source and the FLIR was again operational.

8. The FLIR in its present state of development is useful only as a supporting device and not as primary search equipment. Given the acquisition costs, technical maintenance and support required to keep the equipment operational and useful, its benefits do not appear to outweigh using familiar and reliable methods like a high powered spotlight and portable video camera. The pedestal mount, nine-inch monitor (with red filter), and yoke performed quite well, but resolution was a problem and the video

3980  
17 Jun 87

Subj: EVALUATION OF SHIPBOARD MOUNTED FLIR

capabilities were peripheral to our procedures and require too much space. If the reticle was removed, and resolution was clarified considerably, the FLIR might be a fine addition to the fleet.

9. Having evaluated various lowlight level televisions in the past, I find them to have more capability than this FLIR and at a much lower cost. A WMEC needs a detection device that can sense targets at a range of five to ten miles and identify them at three to five miles. This allows for effective covert surveillance. Additionally, this device must be on a stabilized platform due to the movements inherent in a ship. The manning level on a WMEC 210' is insufficient to man a second lookout so remote control would allow the bridge watch to effectively use it.

10. DECISIVE was pleased to have been chosen as a testing platform for the FLIR equipment. It was a pleasure working with the R&D representative (Mr Frank Replogle) and technician (Mr Bob Berry) and having them aboard. I look forward to further results and developments in infrared technology and offer to provide any further assistance as a testing facility.

  
L. E. PARKIN

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